THE IRON TRADE REVIEW

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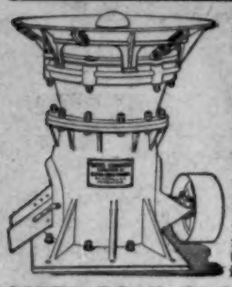

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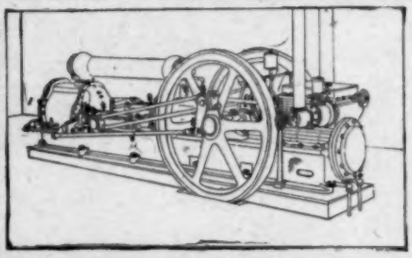

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THE IRON TRADE REVIEW

VOLUME XXX. CLEVELAND, O. NOVEMBER 25, 1897. CHICAGO, ILL. NUMBER 47

THE WEEK IN IRON CIRCLES.

The iron market continues to tend in the buyer's favor, but not enough so to persuade him that this is the time to buy — at least not largely. There is a general settling down to the belief that six or seven weeks of comparative quiet are ahead of the trade and that for the most part business for 1898 will be done when 1898 comes. The finished material trades show some fresh weak spots, but $1 a ton off the prices prevailing in October is just enough to indicate the desire of the mills to make sure of part of their winter's work, and to lead buyers to provide for just such material as will be needed in the early future. In the East, bridge and shipyard work have given plate and structural mills a fair run of orders. Mills in the Central West have been sharper bidders for all that has come up recently, in whatever territory, and plates have touched 1c, Pittsburg. On bars, iron and steel, 1c, Central Western mill has been shaded a trifle on good contracts. In the Chicago district some car business is given out with each week, but it is regarded as only an indication of the larger volume in this line which the roads will place in the next three months. Sheets and wrought pipe are for the moment the firmest among finished products. While on the former there is some indication that an easier market may result from some laxness in the enforcement of scale regulations in tin mills rolling for the general sheet market, the current demand holds prices well on 1897 deliveries. Plate and bar mills show more anxiety about December and January business than others and an interval of lower prices would not be surprising. Such figures, however, are not considered by mills on contracts running far into 1898. The disposition all along the line is to hold in readiness for profitable business in the coming year. The basis for contracts in steel is not yet determined. There has been but small basis in actual business for the Pittsburg reports of $15 billets. From 1,000 to 1,500 tons of speculative steel on which shipping directions were imperative, probably takes in all that went at that price. But the transactions have been enough to stop trading until the situation develops. Bessemer pig iron has dropped to $9.50 valley furnace for 1897 delivery, and on December and January iron $10.20 Pittsburg is reported, with the market still a waiting one on first quarter's business. Several inquiries from considerable buyers of foundry iron are reported by sellers of Southern brands, but in general the market for foundry and forge irons is quiet. Here and there concessions in price are made, though chiefly on Northern irons, which have sold on the basis of $9.50 for No. 2 at valley furnace.

THE CLEVELAND DISTRICT.

The announcement of a 10 per cent advance in wages, effective Jan. 1, has been made by a number of important mining companies on the Menominee range, and thus one factor in the situation for 1898 is practically determined, as the advance will without doubt be general. The only other development of the week in iron ore is renewed reports of efforts by the Carnegie-Oilver ore interest to acquire control of the Cleveland-Cliffs Iron Co. It may be said on authority that no such effort is being made and no negotiations looking to that end are in progress. More than usual attention may have been directed to Cleveland-Cliffs stock by the currency of such reports in one form and another in the past two months, so that more of it is changing hands than in ordinary circumstances. The advance in the price is what might be expected from the prospect of dividend-paying which has come from the general improvement in the iron trade. Some stock has brought $42, in the past week, whereas $27 was paid three and four months ago. It may be considered that the stock now more nearly approaches its proper value, with the disappearance of the conditions in the iron trade that especially depressed all prices.

Pig Iron With the new year only five weeks ahead, the lifelessness always noticeable at this time is on the pig iron market. A sale of 3,000 tons of Bessemer at $9.50 valley furnace is reported, but there is very little movement—little surplus metal will be made in the balance of the year, and little is needed, the prodigious output of Pittsburg furnaces keeping closer pace of late with the needs of connected steel works. Buyers offer $9.75 to $9.90 for deliveries in the first three or four months of 1898, but furnaces are not ready to close any considerable tonnage. Coke at $1.65 to $1.75 represents the general level to which speculation on the subject has settled, but the official announcement is still awaited. An unusual number of coke contracts that have been in vogue for considerable periods will expire with the end of the year. Foundry iron is quiet, with $9.50 to $9.75 for No. 2 at valley furnace representing current business. Gray forge is $8.75 to valley furnace. We quote Cleveland prices:

Bessemer	10 25	Valley Scotch No. 1	$10 90@11 25
No. 1 Strong Foundry	10 90@11 15	Valley Scotch No. 2	10 25@10 55
No. 2 Strong Foundry	10 25@10 50	Gray Forge	9 40@ 9 50
No. 3 Foundry	9 75	Lake Superior Charcoal	12 00@12 25

Finished Material. An inquiry for open-hearth plates for a conduit of riveted steel is in the market, and contracts for 400 to 500 tons of open-hearth bars are pending. Tank plates are somewhat lower, 1.10c Cleveland being shaded, though 1.05c, Pittsburg (8½c freight), is the common quotation. Structural material is firm on ordinary business at 1.10c Pittsburg. The sheet market is well maintained, and deliveries promised for 1897 will keep most Central Western mills very busy. Bar iron is weaker, and delivered prices on good specifications would indicate that less than 1c was netted to valley mills. Wire is held at $1.15 and nails at $1.45 Cleveland, though a lower price is named by an outside mill. Wire and nails promise little change, with rods firm and an important Western interest oversold on rods for 1897 delivery. Old material is lower. We quote old iron rails at $14.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1141 MONADNOCK BLOCK, Nov. 24.

Almost all business closed is in small lots, and the inquiries being received every day do not denote an increase in the size of orders in the immediate future. Those consumers who are in need of material are not anxious, apparently, to contract for it very far ahead, but are content to wait until after the turn of the year before placing any large contracts.

PIG IRON.—Both Northern and Southern furnaces report a light week, and prospects for the future are not especially encouraging for an increase of business. However, none of the producers are making any reductions in prices. Some of them are asking more money for deliveries running very far into next year, although they do not find the consumers willing to pay any advances for extended deliveries. The foundries in this district are nearly all fairly busy, and a good many of them are very full of orders. This is indicated by the fact that none of them are asking furnaces to hold up deliveries, but on the contrary are asking them to hurry shipments in many cases.

Lake Sup. Charcoal	$12 50@13 00	South'n Coke No. 3	$10 35@10 60
Local Coke Fdy. No. 1	11 50@12 00	Southern No. 1 Soft	11 00@11 25
Local Coke Fdy. No. 2	10 75@11 00	Southern No. 2 Soft	10 60@10 85
Local Coke Fdy. No. 3	10 25@10 75	South'n Silveries	11 25@11 50
Local Scotch Fdy. No. 1	11 50@12 00	Jackson Co. Silveries	12 50@14 50
Local Scotch Fdy. No. 2	11 00@11 50	Ohio Strong Softeners	12 00@12 25
Local Scotch Fdy. No. 3	10 50@11 00	Alabama Car Wheel	16 00@17 00
South'n Coke No. 1	11 00@11 25	Malleable Bessemer	10 75@11 00
South'n Coke No. 2	10 60@10 85	Coke Bessemer	11 50@12 00

BARS.—Business has not been heavy, orders being limited to small lots in nearly every case, and there is not much probability of an increase before the first of the year. The mills in this district are all running full, and have orders in hand which will keep them busy until Jan. 1, and in some cases for some time beyond. Prices are made at 1 10c to 1.15c for common iron, 1.20c to 1.25c for guaranteed iron, and 1.20c to 1.25c for soft steel bars from strictly billet stock.

CAR ORDERS.—No large orders were placed last week, but several for from 10 to 50 cars have been given out. The largest business in the market is an inquiry for 400 ore cars from the Duluth & Iron Range, mentioned previously. This will probably be placed soon. The order for 2,000 cars, referred to recently was placed by the Illinois Central road with the Haskell & Barker Car Co. The same road placed orders for 250 cars each with the St. Charles Car Co. and the Missouri Car & Foundry Co. The material for these 500 cars was bought last week from Pittsburg. Other orders for material, in small lots, aggregated a quite good tonnage. The Chicago Great Western Railway has bought 300 cars from the Pullman Co.

RAILS AND TRACK SUPPLIES.—No business has been done in this market, except in small lots. Prices are unchanged, and are made as follows: Rails, $20.50 to $22.50, according to specifications; steel splice bars, 1.20c to 1.30c; track bolts, with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.60c to 1.65c.

BILLETS AND RODS.—Only a few small orders have been closed in this market. The local mills are not in position to accept business, having order books filled until some time into next year. Quotations are nominal at $18 for billets and $25 for rods.

STRUCTURAL MATERIAL.—The only large contract placed was for 700 tons, for the addition to the Studebaker building, noted last week. General business in small lots was quite good. The market is a little inclined to be weak, in some respects, but no changes have been made in prices, which are as follows: Beams, 15-inch and under, 1.30c to 1.35c; 18, 20 and 24-inch, 1.40c to 1.45c; angles, 1.20c to 1.25c; plates, 1.30c to 1.35c; tees, 1.30c to 1.40c. Small lots from stock are quoted at one-quarter to one-half cent higher.

PLATES.—Mill business was light last week. Store business was fairly good, but did not include any very large orders. Quotations are as follows: Tank steel, 1.30c to 1.35c; flange steel, 1.40c to 1.45c; fire-box steel, 1.85c to 5c.

SHEETS.—Orders for both black and galvanized sheets are small, and are not expected to increase immediately. Quotations are made at 2.20c to 2.25c for No. 27 black and 80 and 5 per cent discount for galvanized.

MERCHANT STEEL.—There is a fairly good demand for small lots, but no large orders are being placed. Prices follow: Open-hearth spring tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire, 1.45c to 1.50c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—The only very large sale of the week was one of 1,400 tons of short length steel rails, at $9.25, made by a railroad to a dealer. Other business was light. Prices are unchanged. Dealers' selling prices are as follows:

Old iron rails, gross	$12 00@$12 50	Axles, net	$14 00@$14 25
Old steel rails, long, gr.	10 50@ 11 00	Cast borings, net	4 00@ 4 25
Old steel rails, short	9 00@ 9 25	Wrought turnings, net	5 50@ 6 00
Old wheels, gross	10 50@ 11 25	Axle turnings, net	7 25@ 7 50
Railroad forge, net	11 75@ 12 00	Mixed steel, gross	7 00
Dealer's forge, net	9 00@ 9 50	Stove plates, net	6 00@ 6 25
No. 1 mill, net	8 00@ 8 50	Heavy melting steel gr.	8 00@ 8 25
Heavy cast, net	7 75@ 8 25	Old iron splice b., net	13 25@ 13 75
Malleable cast, net	9 00@ 9 25		

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, Nov. 24.

Sheets do not feel the general weakness and are increasingly scarce for this year's delivery. Wrought pipe is likewise holding its own, but in other lines, raw and finished, the pause in buying continues, with a generally weaker feeling.

PIG IRON.—Bessemer, foundry and gray forge irons are alike lifeless and the indifferent inquiries only bring out the possibilities in low prices. Coke prices for next year seem now to be less a matter of concern to producers than has been the case for several weeks, the assertion now being made that furnace coke will not be above $1.75 for the first quarter. Pending definite information on this point furnaces are waiting. Bessemer is to be had at $9.50 valley for this year and gray forge is quoted at $9.40 Pittsburg, with buyers' offers somewhat lower. We quote:

Bessemer, valley	$ 9.50 to $ 9.60
Bessemer delivered Pittsburg District	10.15 to 10.25
No. 1 Foundry	10.75 to 10.90
No. 2 Foundry	10.25 to 10.40
No. 3 Foundry	10.00
Gray Forge	9 25 to 9 40

BILLETS.—The supply of billets for this year is comparatively small, yet middlemen have offered steel during the week at $15, maker's mill. Mills, however, and some selling firms are still quoting $16. No sales are reported and mills have little for this year's delivery. Consequently they are not doing business. Nothing of any consequence is being done for next year. Sheet bars can be had from but one mill for this year and deliveries are not guaranteed. The Bellaire Steel Works have resumed bar shipments. Quotations are made at $17.25 and $17.50, valley mills.

STRUCTURAL MATERIAL.—Beams are held at 1.10c, in the face of smaller buying. Small lots comprise the tonnage. Other shapes are also holding prices firmly. Mills are asking for beams 15 inches and under 1.10c; 15 to 18 inches, 1.20c; tees, 1.20c; zees, 1.10c; angles, 1.10c, and universal plates, 1.05c.

RAILROAD AND TRACK SUPPLIES.—From the records of the year so far it is evident that the tonnage of the Edgar Thomson mill for 1897 will be much larger than that of any former year. The Duquesne mill is now, and has been for some time, running on billets. Rails are nominally held at $19 and $20 for light and standard sections respectively. On track material we quote: Iron track bolts, 1.65c to 1.70c; steel spikes, 1.45c to 1.55c; splice bars, 1.10c to 1.15c; links and pins, 1.15c to 1.20c.

SHEETS.—Sheets are the most active feature of finished material. Over-sold sheet mills have been in the market largely for ten days past and have found difficulty in covering their needs. The wants of galvanizing and corrugating mills have been heavier than usual and these, too, have not found enough material for delivery before January. For delivery beyond January practically no selling is being done. Prompt shipments continue to be at a premium, nothing below 2.10c being accepted for No. 28. For January shipments prices are easier and there are rumors of cutting of the association schedule. It is also hinted that tin mills turning out sheet mill lengths are not paying sheet mill wages and are thereby able to make lower quotations. Galvanized sheets are active again and are quoted at 80 and 5 per cent off list. The slow deliveries of bars hold black plates for tinning steady at 2.30c, maker's mill.

SPELTER.—The break in the spelter market has been followed by a steady drop in prices, $3.85 and $3.95 having been accepted in the last few days.

BARS.—Steel bars are again openly quoted at prices current three months ago. One large mill is booked for three weeks,

but producers generally are eager for tonnage at 1c. Business in iron is going largely to the valleys. On best all-muck bar we quote 1.35c and on common, 1c valleys and 1.10c, Pittsburg.

PLATES.—A large tonnage in plates has reached the bidding stage and awards are probable within the week. For the four vessels being built by the Boston Fruit Co. for West India trade 4,000 tons of plates will be let in a few days. Another fleet for Alaska trade and a revenue cutter are to be let also. Plates are weak and on Bessemer and open-hearth tank, 1c is quoted. We quote shell at 1.10c, flange at 1.15c.

FERRO-MANGANESE.—Ferromanganese, 80 per cent, domestic is quoted at $47 and $48.

PIPE AND TUBES.—Demand for merchant pipe is of smaller proportions than a week ago but there is no interruption in the rush for boiler tubes. By the larger mills discounts are being maintained as follows: Butt weld black, 72 per cent off; lap weld black, 78 per cent off; butt weld galvanized, 67 per cent off; lap weld galvanized, 70 per cent off. The second discount is 10 per cent on car load lots. Discounts on merchant boiler tubes are as follows: 2¼-inch and smaller, 72½ per cent off; 2½-inch and larger, 75 per cent. off.

OLD MATERIAL.—A lot of 2,300 tons of short and mixed lengths of old iron rails has been offered for sale by a Western railroad and smaller amounts of other material have been on the local market, but the tonnage sold during the week was small. Old iron rails have brought $14 and are offered at $14.25. Steel rails are selling at $10.75 and $11, and wrought scrap is nominally $12 and $12.50. Prices are weaker than at last week's report.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Cincinnati There has probably been during the past week a better inquiry than for some time past, although it is not likely that a much better business has been done. New orders are principally of the retail kind, yet shipments on old orders are more than satisfactory. Many concerns have been obliged to ask to have shipments made at a greater rate than the contracts specify and it is evident that stocks are not accumulating in consumers' yards. An extended inquiry among the consumers of iron in this district shows that consumption is large, and many of the works are crowded with orders. One rolling mill company stated that it had all it could do for the remainder of the year, and contracts are still coming in at profitable prices. Salesmen hear of very few offerings by furnaces at less than full prices, and when quotations are cut, it is to move some special lot. A visit to the Birmingham district shows that most of the furnaces are nearly bare of stocks, and some of them have but a few hundred tons on their yards. No relief is promised in the way of increased supplies of coke and ore during the winter, and production seems to be at its maximum. In Northern irons, there is a little demand at current prices, but no sales of importance have been reported during the past week. From a seller's standpoint October and November thus far have been disappointing, but remembering the very great tonnage of orders booked in September it was out of the question to expect that business could steadily continue at that pace. The expectation, however, is very general that before long there must be considerable more buying. The only question is when this buying will come and at what prices it will begin. We quote for cash, f.o.b. cars Cincinnati: Southern coke, No. 1 foundry $10; No. 2, $9.75; No. 3, $9.45; gray forge, $9.25; mottled, $9; No. 1 soft, $10; No. 2, $9.75; Hanging Rock charcoal, No. 1, $14.50 to $15.50; Tennessee charcoal, No. 1, $12.50 to $13; Jackson Co. silvery, No. 1, $12.50 to $13; standard Georgia car wheel, $14.25 to $15.

Buffalo. The trade of the past week in the district tributary to this market and that part of the State west of the Hudson River has indicated a tendency to take hold again in a larger buying way. A number of the larger buyers have been in the field inquiring for next year's deliveries and some contracts of considerable size have been closed. Local furnaces are still much behind their orders and bending their energies chiefly to satisfying customers who are urgently calling for their deliveries. It was thought the month of November would see this pressure removed, but the transactions of the past week have postponed that prospect for another month. We quote below on the cash basis f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, $11.25; No. 2 strong foundry coke iron, Lake Superior ore, $10.75; Ohio strong softener, No. 1, $11.75; Ohio strong softener, No. 2, $11.25; Jackson Co. silvery, No. 1, $14; Southern soft, No. 1, $11.75; Southern soft, No. 2, $11.35.

Philadelphia On December and January business buyers are quoted prices below any that have ruled in the past month; but sellers are not disposed to look with special favor on offers of to-day's figures for long deliveries. There is an impression among buyers that the market may be yet more favorable to them before the close of the year; yet it is evident that when any active buying comes it will soon take the market out of buyers' hands. The amount of business in hand is enough to prevent any great anxiety for orders; yet the mills have reduced the amount booked in the past two months and as always when business slacks off there are some weak sellers. The concessions offered are not noteworthy, billets being the weakest point in the line, and the general prediction is that a buying movement in January will change the aspect of the market. Meantime the prospect is for a limited amount of trading. The pig iron market continues dull, buyers holding off, and quotations are unchanged at $12 to $12.25 for No. 1X foundry, $11.25 to $11.50 for No. 2X, $10.75 to $11 for No. 2 plain, $10.50 for standard mill iron and $10.25 for ordinary. Sales of billets have been made at $17.50 to $17.75, and the former figure can be had, though buyers are not fully persuaded that this is the end of the decline. Prices on finished material are not so strong this week. The bridge works and shipyards have good prospects for the winter, and plate and structural mills will be reasonably well employed even through the quieter weeks. Bars are lower and indications are that competition will be sharper in the next few weeks. We quote: Refined iron bars, 1.15c to 1.20c; steel bars, 1.15c to 1.20c; plates, 1.2c; angles, 1.15c; beams, 1.25c to 1.40c.

THE TIN PLATE MARKET.

There has been no quotable change in the market East or West during the past week, as far as the mills are concerned, though apparently the continued dullness and scarcity has caused some of the dealers, who are holders of large blocks of plates, to lower their prices, perhaps in the hope that by so doing they will stimulate buying. As far as can be learned these offerings at reduced prices have been confined entirely to the dealers, and it is generally believed that not much business has resulted.

The mills all continue well supplied with orders for the next two or three months. As a result they are very independent as far as quick business is concerned, and few are anxious to undertake forward deliveries at existing low prices.

The outlook for next year is promising in the canning business and it is generally understood that the acreage in small fruits and vegetables will be much larger than during the present year, which will result in much heavier business by the can makers. If this proves to be true, undoubtedly there will be business enough for all of the mills after April 1; and in that case buyers at the low prices recently heard of, for deliveries extending through to August and September, will be the gainers. We quote f.o.b. maker's mill, Pittsburg or Indiana district, as follows:

CHARCOAL TINS.

	IC	IX
Lisvane Grade,	$3.45	$4.20
Calland Grade,	3.65	4.35

COKE TINS.

IC, 108 lb. Basis weight,	$3.00
100 lb. " "	2.90
95 lb. " "	2.85
90 lb. " "	2.80
85 lb. " "	2.75
80 lb. " "	2.70

TERNE PLATES.

IC, 216 lb., 20 x 28	$5.95
200 lb. "	5.65

THE General Electric Co., in the months of June, July and August, received orders for 278 generators, aggregating nearly 14,000 kilowatts, for lighting purposes alone.

THE IRON TRADE REVIEW

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PENDING RAILROAD LEGISLATION.

A measure certain to come anew before Congress at the forthcoming session, is a bill to permit railroad pooling under certain well defined restrictions. The greatest obstacle to the success of such a measure will continue to be the popular prejudice against any form of industrial combination. In the past year this feeling was strengthened and given judicial sanction in the decision against the Trans-Missouri Traffic Association. Yet it is becoming evident, as the courts and the commission pass upon one phase and another of the Inter-State Commerce act, that there is a deep-rooted belief among students of the problem that the railroad is a unique institution, that cannot be regulated by hard-and-fast laws, and that demands a treatment of its own at the hands of legislators. The Inter-State Commerce Commission, for example, that set out to hold the railroads to the strict letter of a statute having all the crudeness of a first attempt to deal with a great and complex problem, soon found occasion to bend, and discretion has had larger play as the commission has grown older.

The recent Supreme Court decision in the "long and short haul case" is in effect that railroads may allow for water competition and other conditions likely to affect rates, when they make up rate schedules, thus giving greater latitude in the enforcement of this much disputed and much violated section of the Inter-State Commerce act. The decision is based on the idea that if the railroads are allowed the initiative in preparing tariffs, they may be held more strictly to the requirement of the act that such tariffs be just and reasonable.

Carrying this principle a step farther, and we come to the ground on which the enactment of a pooling law is advocated. Secret rate-cutting has never yet been prevented by statute, but it has wrought uncounted injury to business, to the railroads making the demoralizing rates and to those operating with some regard for the law. The proposal is to give the initiative in rate-making to the railroads, but with such restrictions as shall secure a maximum of stability and uniformity. It is one of the most obvious facts in connection with certain industrial operations that railroad rates are the arbiters of trade. The coal trade of the Central West is a conspicuous example. In iron and steel there have been abundant instances in the past few years of the way in which manipulated rates can set one district up and bring another down. The struggle for business between lines has led to the making of rates involving loss to railroad stockholders and waste of properties, in the periodic wars that are inseparable from the present regime.

To say that these conditions must go on, is to take the position of those, for example, who refuse to restrict the evils of the liquor traffic, because such restriction may not bring all that is desired in the way of cure, and who meantime consent to the continuance of conditions admittedly hurtful. The evils of rate wars and of secret rate cutting are admitted, yet the restrictions possible under pooling are opposed, even though under the pool regime the shipper is protected by the commission and the courts, and is guaranteed stable rates.

While the outlook, particularly in some of our Western and Southwestern States, does not seem as hopeful as could be wished, we believe that there will yet come a reaction from the anti-railroad policy that has done so much to throw discredit on our railway securities and by perpetuating inequalities and abuses in transportation charges, has hampered industry and checked development. It may be too much to expect a broad view of the question from the incoming Congress, but there are not lacking indications that this pooling proposal will yet have consideration as a solvent of many of the evils which have been accented in the years of depression.

BUYING AND SELLING CONTRACTS.

So little effort has ever been made to secure the enforcement by legal process of contracts between buyers and sellers of iron and steel, that there has crept into the trade a disposition to look upon such engagements as buyers' options. This they have been in fact, in a good deal of the business done the past four years, and contracts have been written in a way that allowed the buyer to take a certain maximum named therein, in case he wanted so much material, and if his wants were less he could let alone what he pleased. Yet even in these "contracts" it was usually an expressed condition that in any event the buyer was to take all the material required by his operations in the given period. In practice this was carried out, unless the market fell off; in that case the buyer's monthly requirements likewise fell off, suddenly, and while the seller might have reason to suspect that material was being secured elsewhere, he rarely had means of establishing the fact, and was compelled to endure the injustice.

Pig iron contracts have been rather more strictly drawn and in general more strictly enforced than those for manufactured material. Yet with some buyers the sales memorandums generally in use have not been regarded as having the force of binding contracts, compelling the purchaser to take all

the iron mentioned in them. Such buyers have treated these memorandums as giving them the right to take a definite quantity of iron within a stipulated period, but as having the effect of option agreements. In a case just decided by the Supreme Court of Illinois, growing out of a transaction between representatives of the Iroquois Furnace Co. as sellers, and Vierling, McDowell & Co. as buyers of pig iron, the court has decided that these contracts are not only valid and enforceable but that their terms cannot be varied by parole testimony. The position of the seller was sustained, moreover, in the contention that where, according to the memorandum, the sale was by sample, the purchaser could not be permitted to prove that some other standard was adopted. The contract covered a period of declining prices, in the recent depression, and the court assessed the buyer the difference between the market price and the contract price at the times the deliveries matured, which were refused.

In view of the large place questions of this nature have taken in the correspondence of sellers of iron and their customers in the past few years, the above decision will be noted with interest throughout the trade.

THE statement of exports of iron and steel from the United States for the nine months ending with September shows a total of 416,249 tons of furnace and mill products. In September there were shipped abroad 16,648 tons of pig iron, 12,260 tons of steel rails, 950 tons of wire rods, 4,500 tons of wire, 2,877 tons of structural steel. The total value of all exported manufactures of iron and steel, including machinery, was $45,693,384 to the end of September, as compared with $34,549,290 in the same period in 1896, a gain of $11,000,000, or 33⅓ per cent. The imports of iron and steel in the nine-months period this year were $10,831,992, as compared with $16,361,429 for the corresponding nine months of 1896—a falling off of 33⅓ per cent.

Personal.

Jeremiah Head and A. P. Head, of London, the former being managing director and consulting engineer of the Otis Steel Co., have arrived in Cleveland. Mr. Head's usual mid-winter trip is hastened in this instance by the death of President P. J. Benbow.

Andrew Carnegie, recent advices indicate, will spend the winter in France, having arranged to take the Villa Allerton at Cannes.

Walter L. Johnson, of Middlesborough, Eng., is making a tour of the iron manufacturing and ore producing districts of this country.

J. S. Robeson has taken charge of the open-hearth steel department and of the blooming mill and sheet bar mills, of the Buhl Steel Co., at Sharon, Pa.

James E. York, who has been experimenting with a beam mill at Ironton, Duluth, for several years, has returned from an European trip.

MINNEAPOLIS papers announce the immediate starting up of the Minneapolis Rolling Mills. The plant is situated in the suburb of Minneapolis, known as Columbia Heights.

T. D. Hazard, a broker, with office at 80 Wall st., New York, died suddenly in Brooklyn, Nov. 10, while on his way to business. He was 61 years old. Mr. Hazard carried on a general brokerage business, which included ores and metals.

LAKE SUPERIOR IRON MINES.

Notice has been given by W. J. Olcott, general superintendent, that the local offices of the Ashland Iron Mining Co. and the Aurora Iron Mining Co. were removed from Bessemer, Mich., to Ironwood, Mich., on Nov. 15.

Within the past week the long cross-cut connecting the D shaft of the Chapin mine with the No. 2 shaft of the Hamilton mine on the tenth level has been completed, and within a short time ore from the Chapin will be hoisted through the Hamilton shaft. A large amount of ore in the pillars in front of the D shaft of the Chapin now becomes available, and its taking out involves the eventual loss of the shaft. Before this takes place the big Cornish pump at D shaft of the Chapin will be dismantled and raised, to be sold eventually as scrap.

The advances in wages at Lake Superior iron mines which it was stated in these columns would be made as soon as the stocking of 1898 ore was fairly begun are announced this week for Menominee range properties. The Chapin, Pewabic, Antoine, Aragon and Penn Iron Mining Co. mines have posted notices of an advance of 10 per cent, to take effect Jan. 1.

The Duluth & Iron Range Railroad Co. has filed an application with the Minnesota board of railroad and warehouse commissioners to increase the capital stock of the company from $3,000,000 to $10,000,000. The road was built by the Minnesota Iron Co., which furnished the money and took the bonds—$6,332,000 of first mortgage bonds and $3,500,000 of second mortgage bonds. The authorized stock is $3,000,000, of which only $500,000 was issued at first. The remaining $2,500,000 has now been sold and the proceeds are being applied to extensions. The proposal for a second line to the Mesabi range is having careful consideration. It would run from Two Harbors to a point near Arthur, and from there to a junction with the Fayal branch of the Duluth & Iron Range road between Eveleth and Virginia. This would make a shorter line to Two Harbors from the western part of the Mesabi range than the present one, and also a shorter run to Duluth. The proposed extension will have a better grade than the present line of the Duluth & Iron Range, but the grades of the latter will be much improved when changes now in contemplation are made.

The refusal of Corrigan, McKinney & Co. to operate the Sunday Lake mine longer, even under the concessions in royalty offered by the fee-owners, indicates a shut-down and the taking up of the pumps, though it is stated that the stoppage may yet be averted. If pumping is stopped at the Sunday Lake the burden of caring for the water of both properties would fall upon the Brotherton mine, which adjoins.

NEGOTIATIONS have been concluded by which the New York party that became a large owner in the Walker Co., of Cleveland, two years ago, take the entire property, including its $2,000,000 stock and its $1,500,000 of bonds. The principal local holders, who dispose of their interest in this deal, are J. B. Perkins, Sidney Short and Frank Billings. The Walker Co., which at first manufactured equipment for cable roads, has in the past two years made a specialty of electrical equipment. The Eastern owners include R. P. Flower, J. W. Hinkley, Anthony N. Brady and Perry Belmont. The manufacture of equipment for electric lines in which its owners have an interest will be an important factor in the business of the company.

JAMES W. MILLER, representing the Uehling casting and conveying apparatus for the production of sandless pig iron, who is now in England, has just arranged for the use of the Uehling carrier at the 10 furnaces of the Millom & Askam Hematite Iron Co., in Cumberland, Eng.

THE Bessemer Limestone Co. and Carbon Limestone Co., operators in the Mahoning Valley, have posted notices of an advance in wages of 20 per cent, taking effect Dec. 1.

A MORTGAGE for $400,000 has been recorded by the American Steel Casting Co., of Sharon, Pa., in favor of the Guarantee Trust Co., of New York.

TEST BARS IN THE FOUNDRY.*

BY DR. R. MOLDENKE.

I must claim the indulgence of the Pittsburg Foundrymen's Association for bringing up what would seem to be a well ventilated subject; but, believe me, the progress of the iron industry is such that it will not be long before strict specifications govern the production of castings for structural and other work, and founders might then wish they had made the first move toward standard methods of testing their work. To illustrate this more fully:—Suppose an engineer is getting up a set of specifications for the cast iron work of some structure in which the castings are subject to tension. As there is little information to be had on this point, he first obtains a lot of samples, tests them, and very likely, knowing little or nothing about iron mixing and founding, selects the piece giving the highest tensile strength for his standard. Suppose this to run 30,000 lbs. to the square inch; straightway he will write 32,000 and hold the founder for its production. The original test piece was probably a white or at least hard iron, strong to the pull, but unfit for shock; consequently, instead of obtaining what he really should have, a serviceable, sound, strong casting, he calls for just the reverse.

So you see that by leaving the question of judging cast iron to those not acquainted with foundry practice, undesirable and positively injurious results may follow. Is there any wonder, then, that where cast iron is to be used for constructions subject to shock, a factor of safety up to 20 is currently found necessary. All this reacts on the founder himself, and retards the use of his product in the onward march of the industry.

You will probably wonder where the test bar comes in. It is here:—If you are asked to furnish castings, and are required to pour test bars with the same iron for the information of the buyer, you can easily manipulate these bars to a sufficient extent in the direction of the qualities called for, to cause a considerable difference between them and the actual castings. The object of a standard set of specifications for the preparation and shape of test bars, to cover all branches of the trade, has for its main object the protection of the buyer, and of the conscientious founder who wishes to stand on the merits of his product.

The nature of the mold, the heat of the iron, the style of the test bar, the method of molding and casting it, and a number of conditions known to the founder, and to him only, have an ultimate effect on the test bar which may cause the rejection of good sound castings as easily as their acceptance, and endless would be the disputes between buyer and seller if this matter is not satisfactorily standardized.

It is to be understood that it may be some time yet before the general foundry trade is required to work under specifications, and many branches of the industry in which the intimate knowledge required is not available to outsiders, may never be called upon to work to closely drawn lines. Yet that this time is coming must be patent to all who have watched the trend of things for the last decade.

The buyer is quick to note any improvement made in a product, as shown him by an anxious seller, and when this knowledge becomes public property it is better to find the founder prepared than to allow the general disturbance in the trade which is sure to result. Again it is to be hoped that the founder may yet have time to solve some of the numerous and perplexing questions arising in the course of his work, before he is called upon to guarantee results which at the present time he very much desires, but cannot always attain.

In an able editorial in *The Iron Trade Review*, Mr. Findley calls attention to the desirability of taking action, on the part of the foundrymen as a national body, on this very point, thus fixing their status when it comes to international action. The engineering, iron, steel, and machinery interests are ready to impress their views on such action. Should this be allowed to go through at the expense of the founder? Let us hope not. A test bar must be made first, and then tested. In the making of the test bar to represent truly the castings, let every one give way to the founder; in its testing he will be glad to stand back and let his work rest on its own merits.

The question of working out such standards means very much and hard study. A review of everything now known to us here and to our friends across the water would form the starting point. An exhaustive discussion of the question in the individual associations would bring out many points, which if properly collected could form the basis of a series of experiments to obtain the data necessary. To be effective, however, action must be taken under authority and with the influence of the national body of foundrymen. For with this, and later on international action, a code of such authoritative standing would result, that foundrymen all over the world would find in it protection from the annoyance of having their hands tied in their own works by inspectors watching their production of work based upon a variety of more or less stiffly drawn specifications.

Several years of patient investigation, comparison, and carefuly study will be necessary to arrive at a proper set of recommendations for national and international approval, and this latter part of the programme is not so difficult for us Americans, as might be supposed, for there are a number of foundrymen in the national body who are at the same time members of the "International Society for Uniform Methods of Testing Materials of Construction." In the next, the Paris meeting of 1900, they could ably take care of the American foundrymen's interests, provided the folk on the other side be asked to work in harmony with us from now on.

To allay the mistrust on the part of conservative foundrymen, it may be stated that the proposed action is not to make cast iron rules regarding the strength or quality of the pro duct of foundries, but only to fix absolutely and authoritatively the shape and method of preparation of the test piece from which the casting may be judged. We are all anxious to get out the best and strongest castings, but it would surely be asking too much of us to tell everybody what results we were getting, unless we were so inclined.

Now for another side of the question. Going back to the basis of the foundry business—the pig iron—we find that there is a great difference in the behavior of irons made by various blast furnaces, even where the chemical composition is identical. This can be traced in a measure to the ores, fuel and fluxes used, just as in the refining of copper the accidental introduction of sulphur, although it is wholly removed afterwards in the polling of the bath, leaves its effect on the ingots unmistakably and to their disadvantage. Then, also, the method of running the blast furnace has much to do with the resulting pig metal. If, now, there is this difference in the strength of irons of the same chemical composition (and I have found it again and again), the founder can demand protection from the poorer grades by calling for standard test bars for comparison with brands of known excellence, and the producers of high grades of iron will be glad to avail themselves of the opportunity to offer them and thus reap the profits coincident with conscientious and high-grade work.

Then will come about quickly a marked change in the blast furnace industry, so far as foundry irons are concerned, and when job lots of "off" casts are offered, a practical guarantee of their suitability for foundry purposes will be demanded, and in fact offered, for I will repeat here that the chemical composition alone is not enough to determine the quality of iron. An account must be taken of the physical characteristics also, so that by the combined use of chemical analysis and physical tests, as obtained from proper test bars, we have the best guide for the production of the kind of work we are after.

So, while at first the adoption of a standard system of preparing test bars seems an undesirable innovation in the foundry business, the results which come from it will be beneficial in the end and mean increased business for the progressive part of the trade. It seems to me that whoever has joined one of the various foundrymen's associations has shown his desire to progress, and he will thoroughly appreciate the advantages which come to those who are found in the front ranks of the trade at all times.

The question of test bars is one of the first to come up in connection with the technical advancement of the foundry business; the rest will follow as a matter of course. May the few ideas here presented find sufficient attention among foundrymen to cause a little reflection, and lead to definite action of some kind on the part of the national body.

*Read at the Pittsburg Foundrymen's Association meeting, Monday evening, November 22, 1897.

EFFECT OF SHOCK ON STEEL AND CAST IRON.

Reference was made in our issue of the 11th inst. to the report of the Committee of Science and Arts, of the Franklin Institute, on the discoveries of Alex. E. Outerbridge, Jr., of Philadelphia, concerning the effect of shock or vibrations on cast iron. A table of tests appended to the report gives the results of independent experiments conducted by the committee. In some cases the gain in strength in bars tested by the committee by rumbling exceeded the maximum gain published in Mr. Outerbridge's tables, by more than 100 per cent. The largest gain claimed in Mr. Outerbridge's paper read at the Pittsburg meeting of the American Institute of Mining Engineers in February, 1896, was a little less than 19 per cent. The Franklin Institute committee made its own bars and tests and obtained 40 per cent gain in strength and 48 per cent in deflection as a maximum increase in the strength of a bar after it had been subjected to repeated shocks. In some cases bars which had been subjected to shocks in the barrel were found to be defective castings, yet they were stronger than companion pieces, free from defects, but not subjected to this treatment.

The question has been raised whether a similar effect would be produced upon steel. Writing on this subject to *The Iron Trade Review*, Mr. Outerbridge says:

"I have been frequently asked this question. I have always replied, 'No.' The conditions are radically different. 'Cooling strains' in cast iron must not be confounded with contraction of steel. The molecular structure of cast iron is determined by the rate of cooling quite as much as it is by the chemical constituents. A large casting and a small one from the same ladle of cast iron are unlike; with steel, however, no such great difference exists between large and small castings poured from one ladle.

"Several years ago I had a solid block of cast iron 15 x 15 x 15 inches cut up into 64 test bars 1 inch square and 14 inches long, numbered and broken. There were eight rows of bars with eight bars in each row. The bars from the center of the block were coarse, open-grained metal, and the strength was scarcely more than one-half the strength of the bars from the outer section. There was a difference of nearly 40 lbs. to the cubic foot in weight of the metal, as determined by specific gravity, between the comparatively close-grained, strong bars from the outer section and the open-grained bars from the interior. This explains, in part, at least, the tremendous cooling strains in cast iron, irrespective of the actual strength of metal, which can be relieved either by slow cooling, as in annealing a car wheel, or by continued vibrations of the metal while cold.

"The large test block referred to above was made in 1888. The result of tabulating the breaking strains of the great number of bars cut from the block convinced me that the attempt to draw any conclusions regarding cast iron, as ordinarily employed, from the breaking strength, shrinkage, etc., of small bars, which are practically uniform in texture, or molecular structure—owing to quick cooling of the metal—would certainly lead to grave errors. Abundant proof of this has since been given to the world in various publications, and more, doubtless, is still to come."

The *Manufacturers' Gazette*, of Providence, R. I., notes that on Monday, Nov. 15, the new Vulcan foundry plant at Pawtucket, R. I., was formally thrown open to business, in the presence of nearly 100 leading representatives of the manufacturing and commercial interests of New England. The first molds to be cast were parts of cotton machinery for the A. T. Atheront Machine Co., of Pawtucket. The Vulcan foundry was established by well-known business men of Pawtucket and Providence, who realized that the need of such an industry was indeed pressing. The concern will conduct a general iron foundry business, and in connection therewith will produce a wide range of brass, copper and composition work, making a specialty of brass electrical railway supplies. The Vulcan Foundry Co. was incorporated in the summer, with capital stock at $100,000. Darius L. Goff is president; Gardiner C. Sims, secretary and treasurer, and the two with Wm. P. Dempsey and Wm. H. Haskell, comprise the board of directors. The work of construction was pushed rapidly and in barely more than three months the plant was ready.

MAKING "DRAWBACK" TIN PLATE AT HOME.

We have already pointed out that American tin plate manufacturers are not very far from being in a position which would enable them to capture the market for "drawback plates." It is difficult to compute exactly what price for American plates would be needed to make them as desirable as the imported plates with the duty rebated, for the reason that the drawback system requires considerable red tape which would offset a somewhat higher price for American plates, and necessitates also the use of considerable capital in paying for the plates more promptly, and in the duty, which has to be paid, and is then returned (or rather 99 per cent of it) at a future date. Besides this, American makers could probably contract for oil plates, on account of their being required in large quantities of the same size, at slightly closer prices than for more mixed deliveries.

Present quotations of Welsh makers, f.o.b. Swansea, are 9s. 6d to 9s. 9d., with 3 and 1 per cent for cash. Allowing 15 cents for ocean freight and insurance, and allowing also for the 1 per cent duty retained by the government, this would lay the plates down at New York at $2.39 per box of 108 pounds. On account of the inconvenience of buying plates in this manner, however, it seems probable that American plates at $2.50, delivered New York, would be as desirable. The market is now within 50 cents of that price. In view of the minor reductions in cost, which are being made in different departments in the tin plate works all the time, the probability of tin plate bars averaging a comparatively low price during next year, and the likelihood that wider bars will bring about a material reduction in the cost of hot rolling, we believe it is safe to predict that within 12 months from this time American tin plate makers will be bidding for the trade of the oil and meat exporters in competition with the Welsh manufacturers.—[Tin and Terne.

Car and locomotive orders for the week, according to the *Railway Age*, are as follows: The Illinois Car & Equipment Co. has an order from Nelson Morris & Co. for 50 refrigerator cars; the Harlan & Hollingsworth Co. is reported to have secured a South American order for six sleepers, six coaches and two baggage cars; the Schoen Pressed Steel Co. has an order for 400 steel cars from the Pittsburg, Bessemer & Lake Erie road, making 1,000 placed in all; the Illinois Central is reported to have ordered 1,500 cars from the Haskell & Barker Car Co., 250 from Missouri Car & Foundry Co., and 250 from St. Charles Car Co.; the C. H. & D. has bought one baggage, one mail and one express car from the Barney & Smith Car Co.; the Duluth & Iron Range road is figuring on 300 ore cars; the Glucose Sugar Refining Co., the Rookery, Chicago, is planning to build 100 tank cars; the Colorado Valley railroad is in the market for passenger cars, a combination car, a caboose, and flat and box cars; the Baldwin Locomotive Works has an order from the Union Pacific, Denver & Gulf road for five passenger engines; from the Pittsburg, Bessemer & Lake Erie for four mogul engines; from the Choctaw, Oklahoma & Gulf for one engine, and from the San Francisco & San Joaquin Valley for three engines.

The Colbert Iron Co., at Sheffield, Ala., has one of its stacks in blast, turning out 275 tons daily, mainly of No. 2 foundry and soft grades. The output will be increased to 300 tons, and will be doubled with the advent, in January, of the second stack in blast. The sales for delivery ahead, including February, approximate 30,000 tons.

The production of minerals and manufactured product therefrom for Alabama during the month of September, 1897, as reported to Dr. Eugene A. Smith, State Geologist and Secretary Alabama Industrial and Scientific Society, by the producers, is as follows: Coal, 518,759 tons; coke, 92,969 tons; pig iron, 70,703 tons; iron ore, 159,566 tons; limestone for flux, 34,000 tons; bauxite, 837 tons; building stone, 3,300 cubic feet. Total number of employes, 13,446 men.

The Winona Mfg. Co., Winona, Minn., assigned on the 11th inst., with assets stated at about $75,000 and liabilities $70,000. The company manufactures gas engines and farm machinery.

PITTSBURG FOUNDRYMEN'S ASSOCIATION.

The November meeting of the Pittsburg Foundrymen's Association on Monday evening, Nov. 22, in spirit and in interest was the best yet held. Thirty-one members were present, as follows: President Robert Taylor, Taylor, Wilson & Co.; Secretary F. H. Zimmers, Union Foundry & Machine Co.; J. S. Seaman, Seaman-Sleeth Co.; Wm. Yagle, Wm. Yagle & Co.; I. W. Frank and William Metcalf, Jr., Frank-Kneeland Machine Co.; Dr. Richard Moldenke, McConway & Torley Co.; S. D. Sleeth, Westinghouse Air Brake Co ; D. L. Evans, C. W. Jones, Messrs. Irwin and Owens, Rosedale Foundry; John A. Logan, Jones & Laughlins, Ltd.; R. B. Lean, Crescent Foundry & Construction Co.; J. S. McDonald, B. D. Fuller, Westinghouse Electric Mfg. Co.; George Green, James Rees & Sons Co ; Samuel Robinson, Robinson Machine Co., Monongahela, Pa.; M. N. Cecil, Center Foundry Co., Wheeling; Jas. Alteman, James Collord; W. T. Mobberley; Chas. W. Friend, Clinton Iron & Steel Co.; Jno. R. Gilmour, Hydraulic Machine Co.; C. A. Stroh; P. Pflaum, Ft. Pitt Smelting & Refining Co.; Wm. Early, William Early & Son; Jas. R. Mills, Jr., *The Iron Trade Review;* E. A. Kebler, Matthew Addy & Co. Paul Kreuzpointner, of Altoona, was a guest of the association and was cordially welcomed.

In the business session the committee of five having in charge the matter of inviting the American Foundrymen's Association to meet in Pittsburg next May, submitted a report. It was announced that a unanimous and very enthusiastic movement had already taken shape in Cincinnati and an invitation is in the hands of the executive board of the national association. It was pointed out that the recent meeting of the Western Association in Cincinnati had awakened the interest of the resident foundrymen and a national meeting would probably crystallize this interest and open the way for a local association. It was recommended accordingly that the Pittsburg Association give way to Cincinnati for next year, but at the same time extend an invitation for the meeting of 1899. The report was accepted and on motion of Mr. Frank the association voted unanimously to extend an invitation for the meeting of 1899.

The paper of the evening was read by Dr. Richard Moldenke, consulting engineer of the McConway & Torley Co., of Pittsburg, whose subject was "Test Bars in the Foundry." The paper appears elsewhere in this issue. After the reading of the paper Mr. Kreuzpointner was asked to speak and made a vigorous plea for an international system of tests. It has been attempted for five years, he said, to reach a chemical standard that would be acceptable to all, but the result is no nearer than when this effort was first begun. The solution lies in a different direction. The standard must be international and every trade should have a voice in fixing its own standard. Let the shoemaker stick to his last. Mr. Kreuzpointner then urged the necessity of technical education in view of our increasing trade with foreign countries. European countries, he said, started in this direction one hundred years before us. Since 1828, in Munich, the professors of the universities have conducted schools for boys on Sunday afternoons and attendance by the boys was compulsory. Successfully passing an examination freed them from apprenticeship. In France, Napoleon personally visited high schools and colleges and ordered that Greek and Latin be no longer taught, but in their stead were prescribed technical subjects. The methods of testing were discussed in detail and the proper procedure, the speaker declared, was to be found in following closely nature's laws. The talk evoked commendation and also a lively discussion.

The following contribution to the discussion, sent by Thos. D. West, was read by the secretary: "So many subjects are suggested by Dr. Moldenke's valuable paper that one is at a loss to select. It is gratifying to note the stand Dr. Moldenke takes on the necessity of a uniform system of physical tests. Many are awakening to the fact that the near future will see the strict specifications governing the production of castings, to which Dr. Moldenke's paper calls our attention, and founders will be wise to heed his warning. Not only should general interest be taken in establishing standard methods for physical testing, but also for chemical analyses as far as this is practical. Where founders are working under the guidance of one chemist or receiving iron from one furnace or locality only, they are not deterred from making true comparisons in working toward desired physical results. But let these conditions change, and varying methods in chemical laboratory work might cause grievous results. Believing that good can come from ascertaining to what degree analyses may differ, where drillings from the same pig are presented for determination, I have decided to try to obtain such analyses from blast furnacemen in different sections. My hope is that the results may further the general adoption of some one system of chemical analyses for pig iron.

"Some may say that progress might be such that the methods adopted to-day could be cheapened one-half to-morrow. Nevertheless while this might be true, the loss in this respect, until the majority could change to the cheaper method, would be small compared with the benefit sure to result to furnacemen by lessening complaints of iron not being what was wanted by the founder.

"In order to expedite this work I would kindly ask furnacemen sufficiently interested in the subject to make one set of analyses, including the carbons, silicon, sulphur, manganese and phosphorus, to address me at Sharpsville, Pa. The drillings from one pig which I would send in response would of course be thoroughly mixed, to make sure all received the same stock. In returning a complete analysis, it would also be of interest to have the furnacemen state the methods they use and the time each determination had taken. In cases where they prefer not to have their names or methods mentioned, such request would be cheerfully complied with. The possession of complete analyses, showing what differences may result by reason of non-uniformity in methods, would in itself pay for the labor expended and greatly further the object sought. The returns, as soon as compiled, I would present in a paper to this association."

Inland Steel Co's Enlarged Operations.

The plant of the East Chicago Iron & Steel Co., of East Chicago, Ind., was sold at receiver's sale Nov. 17, to P. D. Block, for $50,000. On Saturday, Nov. 20, the Inland Iron Forge Co. was incorporated at Chicago to take over the East Chicago plant. The capital stock is fixed at $225,000, and the incorporators are Philip D. Block, G. H. Jones and Frank Wells. The stockholders of the new company are practically identical with those who own and operate the Inland Steel Co., at Chicago Heights, which makes various agricultural and other shapes. The business of the latter company has increased to such an extent that it has been unable to fill all orders, and this was the prime reason that led to the purchase of the East Chicago plant. Frank Wells & Co., through A. W. Erskine, agent of the East Chicago Land Co., have secured 11 acres of land to be used in connection with the purchase, at a valuation of $30,000. The purchase of additional land was made in contemplation of further increasing the capacity, but strong pressure is being brought to bear on the Inland Iron Forge Co. to remove the plant to Chicago Heights. The matter is under consideration.

THE Peoria Steel & Iron Co., Peoria, Ill., advises us that it is making plans to start its plant, chiefly on the manufacture of hoops and cotton ties. The company is now getting figures on the most improved machinery for the manufacture of these specialties. It is also figuring on adding open-hearth furnaces for the production of its own billets.

ON Friday, Nov. 19, the Aultman & Taylor Machinery Co., of Mansfield, O., received 13,000 h. p. in orders for boilers. Of these orders 7,000 h. p. were for the Cahall vertical type and 6,000 h. p. for the Cahall-Babcock & Wilcox type. This is said to be the biggest single day's business ever done by any boiler manufacturing concern since water tube boilers were first invented.

THE Meehan Boiler & Construction Co., Lowellville, O., received the third order from the Girard Iron Co., Girard, O., for its water tube attachment. The first attachment was put on in June. This order was soon followed by another, and lately the Lowellville company received an order to equip the entire plant, making 12 boilers in all.

Review of the Technical Press.

[Translations, Condensation and Comment expressly for The Iron Trade Review by Dr. R. G. G. Moldenke.]

Experiments with Blacksmiths' Forges.—[*Stahl und Eisen*, Sept. 15.]—Among the recent improvements in the working of blacksmiths' forges, the use of crushed coke, and of atomized water in the blast, is mentioned by Mr. Haedicke. While crushed coke has long been used in England, its introduction on the Continent is very slow, in spite of the manifest advantage over coal. By the term crushed coke is meant coke which will pass through meshes three-quarters inch square but not through one-half inch. The experiments were conducted in the manual training school "Rentscheid," where eight forges are in continual use. The atomized water in the blast is arranged to come in under the fire, illustrations being given, and causes intense heat locally. When used with coal there is no sign of smoke, after the first few seconds, on throwing on more fuel. The trials were conducted with a view of obtaining not only the heat developed but also the relative consumption of fuel; consequently for every experiment, weighed pieces of three-quarter inch round iron four inches long were heated as rapidly after each other as possible up to a cherry redness, noting the time and fuel consumption. The red hot pieces were dropped into water, and the temperatures were noted before and after. The following methods of heating were tried, the forges being handled by thoroughly competent foremen blacksmiths: Coal fires with side blast; coal fires with bottom blast. An ordinary coke fire with coal thrown on, and bottom blast. The same with crushed coke only. Finally, bottom blast with atomized water for the crushed coke fire, and for a coal fire. The results were tabulated and show the following: The ordinary coal fire with side blast utilized only 1.66 per cent of the heat units of the coal; with bottom blast the efficiency rose to 2.75 per cent. Coke and coal gave 2.62 per cent; crushed coke, 4.20; bottom blast with atomized water and coal giving 3.30 per cent; while the same with crushed coke rose to 5.00 per cent. This would show that improvements can be made sometimes where least expected. It is to be understood, of course, that not all this advantage is to be ascribed to the atomized water and bottom blast (for water is decomposed and recomposed by red hot fuel without adding to the available heat units); the nature of the fuel has considerable to do with the economical handling of the fires.

Hydraulic Machinery for Foundry Purposes.—*Power and Transmission* for October traces the advent of machine power in the foundry back about 25 years, and states that the field is but partially cultivated, much remaining still to be accomplished, for there are foundries in which no machinery whatever is used. Among the many applications still to be made in the average foundry are the transportation of pig metal and fuel from the yard to the furnace; the lifting, the lowering, and transporting heavy molding boxes and castings; the cleaning and carrying of the castings when finished; conveying of the molding sand; breaking pig in blocks; molding machinery, etc. In all of these the effort of the muscles is best replaced by some elementary power. The claim is made that for power transmission the hydraulic method is the best and cheapest, a statement which the founder, or anyone who has tried it, without prejudice either way, will accept with a mental reservation; for although it is easy to put in a pump, connect with a pressure tank, and pipe up, it is another thing to run without a break-down for any length of time. Among the advantages enumerated are the small size of the plant and the fact that it can run automatically. Against it are the danger from freezing and the difficulty of keeping the system tight under heavy pressures, while with light pressures the machinery becomes too bulky. The best working pressure is given at 600 to 1,200 lbs. per square inch. A number of details regarding the handling of hydraulic machinery are given which are good to know, for while the reviewer differs from the author regarding the general utility of the hydraulic method of transmitting power, he agrees with him on the special application with molding machinery. In regard to the use of hydraulic power versus steam or compressed air for molding machinery, the words of the author are best quoted: "In the case of stamping (by steam or compressed air) a comparatively thick layer of sand must be pressed by a single blow, whereby irregularities in the density of the sand are frequently produced. This defect is avoided by the slow action of pressing," to a considerable extent, "the pressure being distributed more equally than by stamping The action of the stamp is just as different from that of the press as that of the steam hammer is from the action of the forging press." The article concludes with a number of points regarding the construction and use of molding machinery.

The Microscopic Inspection of Steel.—[*Engineering News*, Oct. 28.]—F. S. Rice has an illustrated article on this subject, giving notes from his personal observations while examining various steels. He believes that the intelligent use of the microscope will enable us to advance towards a more homogeneous product, gain all necessary knowledge as to heat treatment, and safely use much higher grade steels and unit stresses. The author finds the reason for the use of such large factors of safety in structural engineering in the lack of homogeneity in the material, and claims that our structural steel has little care bestowed upon its manufacture, statements to which the editor very properly takes exception. The author is correct, however, in saying that chemical analysis alone is unsafe to predict upon, so far as the quality of the steel is concered, and the microscope quickly shows the investigator why. Chemical and microscopic analysis both can show the carbon contents within close limits, but the microscope has the additional advantage in showing the heat treatment the piece has received. If, then, by more perfect, even if expensive, treatment better material be obtained, the additional price will be gladly paid. The author now explains the technical terms used in connection with the microscopical examination of normal, quenched, and annealed steels, and gives the mode of occurrence and formation of the various constituents, all of which has been described already in these columns a number of times. When steel is quenched it is called martensite, of which it is desirable to know much more, for the author rightly says it is the key to the tool steel industry. The problem of the hardening of steel is still unsolved, for it is a physical condition rather than a chemical one which confers hardness to the quenched steel. The paper concludes with a description of the cuts showing the various phases of low, medium and high carbon steels annealed, and when quenched.

Preparation of Carbide of Iron.—[*Stahl und Eisen*, Oct 1.]—According to Moissan, pure iron (Swedish or electrolytic) which is melted in the electric furnace in contact with pure carbon, units with it in increasing quantities as the temperature rises. Strange to say, it becomes more and more pasty, so that at the melting point of titanium, it can no longer be poured. If the temperature is lowered the metal again becomes liquid, and by letting it cool slowly and solidify, a gray button full of graphite and with but little combined carbon is obtained. By pouring into a chill while at about 2,450 degrees F., white iron is obtained. If the material, while at 5,400 degrees F., is suddenly chilled by throwing upon it some cold water, a product is obtained containing 5.25 per cent of combined carbon, most of which is a carbide of iron, Fe_3C, which also exists in some quantity in steel. To get it in a pure form complete saturation of the melt and care to prevent the formation of graphite are essential. This can be well done by taking about a pound of Swedish iron, heating it in a graphite crucible for three minutes in an electric furnace with a current of 900 amperes and 600 volts, taking out the crucible and dipping it into cold water, which by the way can be done without danger. The hard crystalline mass is freed from surplus iron by remaining for 24 hours as an anode in a 7 per cent hydrochloric acid solution, having a carbon plate for the cathode. The remaining carbide still contains some free carbon and carbohydrates, which are removed by letting it remain for some time in fuming nitric acid as free as possible from water, and to which a little potassium chlorate has been added toward the latter part of the process. The carbide is washed in water, alcohol, and ether. Other methods of purifying the carbide are given and its properties fully described, its form being in the shape of voluminous white crystals of Fe_2C with a specific gravity of 7.07.

VARIOUS FORMS OF POWER TRANSMISSION.

The adaptability of ropes to do the work of belts, without the limitations of belts, was soon recognized. In England they soon began to be applied for main drives as substitutes for very heavy, long and expensive belts, and the most obvious method was adopted, viz., the multiplication of single-rope belts running in grooved wheels, to acquire in the aggregate the requisite carrying power. But the aggregation of single-rope belts carries with it limitations which confine its usefulness within comparatively narrow bounds. It is impracticable to secure uniform length for several independent rope belts, because it is impossible to regulate or limit the amount of stretch of each one.

It is also impracticable to apply tension devices separately to a number of rope belts running side by side, close together, and it is useless to apply such a device, common to all the several ropes.

Hence, it became necessary that the rope should be heavy to insure proper pressure and adhesion to the wheels by its own gravity. To accomplish that end with uniformity as to the driving and driven wheels, it becomes necessary that driving and driven shafts shall be both horizontal, not far from the same level, and at a considerable distance apart. Under these favorable conditions the English system is efficient and economical, but the limitations preventits application in any place where such favorable conditions are not attainable.

In 1885, Wallace H. Dodge, in America, proposed to employ a single endless rope in multiple wraps, and to apply thereto a proper tension device, thus at one stroke eliminating the limitations of the Swiss and English systems, and making the rope universally applicable for all power transmission purposes, regardless of distance and direction.

According to the Swiss or English systems, if the power to be transmitted is too great for a single rope of practicable size, then two or more ropes are employed, running in grooved wheels side by side. According to the American system, as above outlined, under the same conditions, instead of two ropes, a single rope is carried two or more times around both driver and driven pulleys, and finally by means of a third wheel it is conducted from the last groove back to the first groove, and the ends joined to constitute an endless rope for the entire system.

By mounting the third, transfer, wheel upon a movable carriage, and hanging a weight to this, it becomes also a tension device, capable of taking up the slack, equalizing the strain on all parts of the rope, and allowing a perfect compensation for hygrometric or other disturbances which affect the length of the rope.—[R. D. O. Smith, in Cassier's Magazine.

Awards to American Exhibitors at Brussels.

The list of awards to American exhibitors of machine tools at the Brussels Exposition is as follows: The "Grand Prix," or highest possible distinction, was awarded to but three concerns, one foreign and two American:—Brown & Sharpe Mfg. Co., Providence, R. I.; The Pratt & Whitney Co., Hartford, Conn., and Le Progres Industriel, Brussels, Belgium. The gold medal, or next to the highest distinction, was awarded to eight foreign and nine American competitors:—Cincinnati Milling Machine Co., Cincinnati; Gould & Eberhardt, Newark, N. J.; G. A. Gray Co., Cincinnati; J. Becker Mfg. Co., Fitchburg, Mass.; Morse Twist Drill & Machine Co., New Bedford, Mass.; Norton Emery Wheel Co. and Prentice Bros., Worcester, Mass.; Bullard Machine Tool Co., Bridgeport, Conn.; Warner & Swasey, Cleveland. The silver medal was awarded to eight foreign and nine American competitors:—Acme Machinery Co., Cleveland; W. F. & J. Barnes, Rockford, Ill.; Bickford Drill & Tool Co., and Bradford Mill Co., Cincinnati; Gisholt Machine Co., Madison, Wis.; Landis Bros., Waynesboro, Pa.; F. E. Reed Co., Worcester, Mass.; Bradley Co., Syracuse, N. Y.; Hendey Machine Co., Torrington, Conn. The bronze medal was awarded to four American competitors:—D'Amour & Littledale, New York; Dwight Slate Machine Co., Hartford, Conn.; Hurlbut Rogers Machine Co., South Sudbury, Mass.; L. S. Starrett Co., Athol, Mass.

BLAST furnace managers in the Shenango Valley have posted notices of a 10 per cent. advance in wages, to go into effect Dec. 1.

THE WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, Nov. 17, at the Great Northern Hotel, Chicago, President C. A. Sercomb in the chair.

The following members were present: F. M. Lyon, Burlington Route Foundry, Aurora, Ill.; W. J. Treat, Treat & Sons, Hannibal, Mo.; C. A. Sercomb, Schwab & Sercomb; B. Hoffman, B. Hoffman Mfg. Co.; Adam Baer, C. M. & St. P. Fdy.—all of Milwaukee; J. Ott, Plano Mfg. Co., West Pullman, Ill.; S. T. Johnston, Whiting Foundry Equipment Co., Harvey, Ill.; L. Knapp, Pullman Car Co., Pullman, Ill.; Robt. Moir, Chicago Architectural Iron Works; Robt. Turnbull, Rockford Grate Co.; C. K. Pittman, Pittman & Dean; A. Sorge, Jr., consulting engineer; Wm. Ferguson, Gates Iron Works; H. Vrooman; Chris. Wolff, L. Wolff Mfg. Co.; Eugene Smith, Crane Co.; H. L. Hotchkiss, Deering Harvester Co.; W. L. Thompson, Link Belt Machinery Co.; and O. T Stantial, Illinois Malleable Iron Co.—all of Chicago.

The application of the Milwaukee Bridge & Iron Works, Milwaukee, Wis., for membership in the association was presented and the company was unanimously elected.

The paper of the evening, prepared by John C. Knoeppel, of Buffalo, was then read by the secretary, as follows:

Plaster Casts and Other Methods of Molding Shell Forms.

The art of constructing plaster casts for the purpose of taking off patterns in metal belongs more to the pattern maker than to the foundryman. The molder is not expected to learn this branch of the trade, as it is not universally practiced and probably not understood by many engaged in foundry work, being more in the line of pattern work.

I will proceed at once, to give you a full description of the method, process and manner of molding and casting the same and will try to be as plain as possible so that it will be clearly understood This form and method of pattern making is very simple and inexpensive, yet very precise and accurate, especially so on irregular work as patterns that require backing out, such as for deep-figured, carved and ornamental designs. To properly back out a pattern so as to make it the required thickness and at the same time produce an even pattern, requires great care and tedious labor. We all know that to make patterns for shell forms of any size or shape requires much time and in many cases untrue or uneven patterns are the result, when built of lumber, causing considerable trouble to the foundryman in using the same in sand on account of their being warped and out of shape.

In making patterns in plaster we first have the outer form made of wood in a block shape. Sometimes this outer part is made of plaster by the aid of suitable sweeps and having such ornamentations and figures thereon as are called for by the designer.

When the pattern is completed, have a true board made with battens on and tongued on the end to keep it from warping Fasten the block to it with screws from the under side, varnish the same and allow it to dry. Then have a flask made for the purpose with an extra nowel part, properly fitted with pins and eyes alike and to suit pattern board. We are now ready for the plaster cast.

Put the pattern board on a bed of sand, fitting the extra nowel to it and clamp the same. Before pouring in the plaster, oil well the pattern and board, olive oil being preferable. Now mix the plaster of paris with water sufficient to give it the consistency of thin mortar, so that it will find its own way to all parts of the pattern, and of sufficient quantity to fill the nowel, allowing it a short time to settle, then strike off and put on a bottom board and secure with screws. Mixing a little parting sand with the plaster hardens it, and it will dry quicker, and have less blow holes and bubbles. After a lapse of 15 or 20 minutes, roll over the plaster cast and unscrew the pattern from the board, taking off the board, the pattern proper still remaining in the plaster. Rap carefully and draw it out of the plaster. You now have an impression the reverse of your pattern. While the plaster is drying take the block pattern and put it back to its original position, being careful to clean it well before using it for molding from it.

At this point you have a concave and convex form of pattern. The plaster cast should be allowed to dry for at least 15 hours, but could be dried in less time with moderate heat.

We are now ready for filling up the thickness in the plaster cast. Have a true board made, with strips of the required thickness fastened to it at each end. This board should be about the size of a kneading board, such as is used in our homes. Mix up a composition of whiting and melted bees wax to the consistency of stiff dough and with a rolling pin roll out suitable sheets, cutting them into different sizes to suit the work, laying and pressing them carefully in and against the surface part of the cast, using suitable tools, the hand and fingers coming into play frequently. Secure the filling with tacks.

This filling or thickness composition should be put only where the pattern line shows, all of it should be well varnished, and when sufficiently dry proceed to mold.

Take the bottom board and pattern, place the nowel for the purpose upon it, being careful that there is no shift, and fit into the pins on board tight, ram this up with sand in the usual way, treating the mold as you would in every case, clamping the same as in the case of pattern making or molding. Roll over on bed and unscrew the pattern from board, taking it off, draw out the pattern proper and finish in the usual way, then proceed to the cope part. Take the plaster cast and place the cope on it, using the same precautions as with the pattern. Provide suitable gates for pouring and ram this part up with sand also. Roll over, being very careful not to disturb the mold in drawing the cast off the cope. Finish as usual.

We now have both nowel and cope part. Close these two parts together, marking the gating points with flour; take off the cope again, cut the gates, reclose flush and clamp up.

When you are ready for the metal, before closing for the last time, be sure that the parting line meets. A little flour will help to fill up if a little slack, thus producing an economical as well as a very true and reliable mold. Sometimes a right and a left form are necessary; such as for heads, birds, animals and statuary to produce a full form. In that case both sides are made in the manner described above.

While at work some years ago in one of the Western foundries, a large number of these patterns were broken and patched so much that they made heavy as well as unsightly castings. The original could not be had, and of course could not be duplicated. I then suggested plaster casts and the work was given me. Using the regular patterns to work from, the first cast was reduced about 10 pounds over the old one. The result being satisfactory, I was given more to make up, due allowance being made for shrinkage.

A large variety of subjects can be made of plaster, and when once acquainted with this branch, many lines can be pursued for plumber's work, tees, elbows, branch-pipes, hoppers, etc. These casts can be preserved for future use, or a number of master patterns may be taken off and stored.

Another good way to take off block patterns is by stripping. While it is not as accurate and precise as the plaster cast, yet it will answer in many cases. The plan is similar to that mentioned but instead of plaster, we work the block directly with sand. The block is made and secured to a true board, as in the case of plaster casts. A cope is fitted to it, and rammed very hard with common sand and rolled over. The board is taken off and the pattern drawn out. Suitable wooden strips are cut to conform to the work and of te required thickness. Now have sufficient paper on hand, cutting the same into suitable strips and lay it on the surface of the mold and nail the paper to the sand until the required thickness is obtained. Then commence laying on the wooden strips, these being cut large or small as required. After all is filled up even with the joint, fill in with fine sand. This might be done while laying in the wooden strips to keep them from falling out of place, being careful not to disturb any part of the mold. Then place the nowel upon the cope and ram up in the usual manner, roll over carefully and take off cope;—the cope is what we term a false coping and is shaken out. After cleaning off the pattern prepare the cope in the usual way. Put it on the pattern board with block fastened thereon, clamping and setting the gate pins and ramming up with sand. This needs to be treated differently from the first case, not ramming too hard, and in the regular way, as in the course of molding. Roll over, take off the board and draw out the pattern. Now finish both parts, nowel and cope. When completed close cope on the nowel, put a little flour on the joint with a bag, lift off and see if joints touch and meet and join securely; see if you have even thickness; then close again and the mold is ready for pouring.

Almost any form of work can be made in this manner, of a smooth character, such as kettles, pipes, drum-tanks, bath tubs, etc.

Still another simple way is to make a core the desired shape with a sweep, drying it and then with the thickness strips lay on the core and ram up.

A few years ago I made a steam receiver with reducing end and flanges, 30 inches in diameter, 10 feet long, reducing end being about 20 inches, weighing about 5,000 pounds.

The party wanted only one casting and it would not pay to go to the expense of making a pattern. I proceeded as follows: Sweeps were made to conform to the shape at each end and at the center. A skeleton frame was also made and was laid on core plates made in halves and dried, with proper core irons, having suitable holes drilled and threaded to handle them in lifting. I placed one-half on mold board, placing the flanges at each end, and having the thickness strips ready to lay on the core and rammed up in the usual way with sand; rolled over and made joint. Put on the other half core, and stripped it as in the nowel, being careful that they correspond with each other. Put on the cope and set the gate pins and rammed up. After lifting off we took out the cores and returned them to oven for redrying, finished the mold, setting chaplets and resetting cores, the latter providing their own prints. This was cast in green sand and turned out very well.

Discussion.

Mr. Baer: We have done some of this kind of work. I think it can be worked very successfully if the men understand it. We have had some experience and had good success.

Mr. Sercomb: There is one thing in the paper that struck me and that was that the writer did not refer to the expansion or contraction of the plaster after forming the mold. Information as to the expansion or contraction would be valuable.

Mr. Baer: There would be a shrinkage if anything. If you had to nail it on the board before pouring, it would shrink away from the frame and drop.

Mr. Ott: I have never had any experience in making ornamental patterns, but I have made a great many casts of plaster of Paris. The only time that I ever found that plaster of Paris expanded was when we put the wood into sand. I would suggest the use of emery dust instead of sand. It causes the plaster cast to harden so that you can hardly cut it with a chisel or knife. I always use emery dust if I can get it. I have made light plaster of Paris patterns but I have never paid much attention to the expansion or contraction.

Mr. Smith: I saw this work done about 18 years ago. We made a kind of mantel work and in making the mantel shelves at that time we called this reversing. I did not understand it as pattern making but as molding. We made it directly in green sand. We took a copy from the pattern made from layers of composition of clay. The way that is described in ithe paper seems expensive. I should like to know which would be the more expensive; to make the mold directly in green sand or from plaster casts.

Mr. Louis Knapp: Instead of being confined to the iron foundry, I think if we should talk this over with people interested in bronze and light metal work they would give us some information. They do a great deal of this plaster work. It is very fine for core-boxes.

Mr. Ferguson: Although I am not very familiar with reversing or making of patterns as described, the principle of the thing is applied I believe in all foundries—in all classes of molding, green sand and dry sand molding and loam molding—in getting the one side of the pattern. Suppose you are making a stove door. You make a plaster cast of the door and make the bottom part of the mold and get the drop from it. The same thing is applied in making a kettle, exactly. Sweep up the outside and inside the full size and then take off the thickness. It is the same principle. So it is true in making pipe of all kinds. That is another application of the same principle. I think you will find it in regular practice everywhere.

Mr. Thompson: I can see where the putting on of this strip can be of considerable advantage in ornamental work or in the making of core-boxes. But in making a pipe or receiver it seems to me that the ordinary way of sweeping up from a spindle with bearings at each end would be a cheaper way of making the casting. This material is expensive. The same in making kettles and anything that can be swept up. I do not see there is any advantage gained by using any material for putting on the thickness; for where the outside diameter is swept up first and the cope rimmed on that and then the thickness put on the sweep and the sweep put in the mold after the cope has been taken out, and the thickness swept up that way, it seems to me it is plainer and cheaper and I think we can apply it to everything but ornamental work.

Mr. Baire: The gentleman is right there. As I understand it, this method is used principally on ornamental work. In pipe or kettle work you can sweep readily in green sand and it is much easier than plaster of Paris by having a double sweep.

On motion, the secretary was instructed to extend to Mr. Knoeppel a vote of thanks for his very excellent paper. It was decided that, after the reading discussion of the regular paper at the next meeting, the discussion be resumed, of the paper by Mr. Truesdale, which was read and discussed at the Cincinnati meeting.

The following amendment to the by-laws was proposed by Mr. Johnston: Amendment to Article V., Section 1:—Substitute the word "plurality" for the word "majority."

After an informal discussion on various subjects of interest to the members, the meeting adjourned.

Electric Transmission and Flooded Conduits.

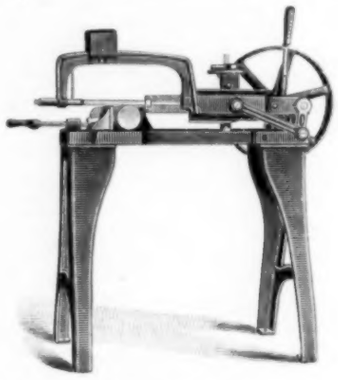
The behavior during flood times of an electric street railway, operated on the General Electric open conduit system such as the Metropolitan Traction Co., of New York is so extensively laying down, is of general interest. While no flooding of the conduit has ever occurred on the Lenox ave. ine, it has been averred that, if it were flooded, traffic would necessarily stop, owing to short circuit, until the water had been run off. That this is not the case is shown by an interesting experience on the line of the Metropolitan Traction Co., in Washington, D. C. On Oct. 9, as the result of a heavy rain storm a stretch of track, 150 feet long on the F street line, became completely flooded, the water filling and overflowing the conduit, as it was unable to run off by the usual sewer connection. According to the statement of Mr. Weaver, president of the road, although the conduit was filled completely with water for nearly two hours, the station was not short circuited, nor were the water rheostats called into requisition. The normal load of the feeder for the section is 300 amperes; the load during the time the conduit was flooded was 600 amperes, and the cars were also operated on the sections on both sides of that which was under water. The water was practically pure and this accounts in part for the small additional load. The Washington electrical conduit system, although its conduit has been several times flooded, has never been tied up, except once, when the water almost covered the floors of the cars and flooded the motors. At other times the line has been operated by means of a reducing rheostat. The present instance is the only one in which the flooded section has been operated directly from the generators without reducing medium. It was estimated that the pressure of the current on the cars in the center of the flooded portion was about 250 volts.

Fred. C. Keighley, superintendent at the coke plant in the Connellsville region, says the Connellsville *Courier*, has begun the construction of one of his "continuous ovens." The oven is being erected near the Oliver No. 1 plant. It will be probably 200 feet long and the burning of coke will be continuous, raw coal going in at one end while coke will be drawn out the other. The bottom will be movable and constructed of hollow pipes filled with a current of water to keep them from warping, which has always been the drawback in metal bottom ovens.

Sharpsville Furnace at Sharpsville, Pa., owned and operated by Pierce Bros. was put in blast Nov. 21 after an idleness of nearly two years.

Q & C SHOP SAW NO. 1.

The demand for a cheap shop saw of small capacity, and one which will cut tool steel as well as other metals, has been met by the Q & C Co. with the saw shown in the illustration, and known as the manufacturer's shop saw No. 1. It occupies floor space 18 x 30 inches, is 26 inches high and weighs 130 lbs.



It has a speed of 50 revolutions a minute and employs a pulley 14 inches in diameter with 2½ inches width of rim. The saw is capable of sawing four-inch solids, and is provided with improved gravity feed for extremely hard metals of small size. An automatic variable feed is a feature. It is possible to change this instantly without stopping the machine.

CHAMPION ROD OIL CUP.

A rod oil cup, suitable for movable bearings, and made round instead of the usual shape, has been designed by the Lunkenheimer Co., of Cincinnati. There is a window on each side of the cup, enabling the engineer to see the height of the oil. The feeding arrangement consists of tubes, one telescoping within the other, the outer tube fastened permanently in the base of the cup and communicating with the oil hole in its shank. The inner tube is fastened to the filling plug, and has small oil holes drilled in it close to the top and carries a regulating nut on the upper threaded portion, the nut being adapted to close in part the oil holes for the purpose of

regulating (when the cup is in operation) the quantity of oil to be fed. The oil tubes telescoping, it is not necessary in filling the cup, to remove entirely the filling plug, but simply to raise it high enough to insert the nozzle of the oil can, which prevents losing plugs. The oil ducts are large and straight.

The cup having been filled, the oil, as soon as it is put in motion begins to travel in a body within the cup, and at each revolution is thrown against the feeding apparatus and flows down through it to the bearing. Thus no matter how little oil there may be in the cup, the centrifugal force, combined with the shape of the body, will carry it to the holes in the feed tube. In attaching the cup, the circular body is so placed that it travels in the same direction as the bearing and the glass sides are parallel with the rod. After the cup is once regulated, it requires no attention other than filling. This cup will not throw oil and feeds only while machinery is in motion. It is made of cast brass.

THE DETROIT BOILER.

The Detroit Screw Works, Detroit, Mich., have just brought out a new sectional water-tube boiler, which is illustrated herewith. It has been named the "Detroit" boiler. In studying out his problem the inventor, Mr. H. H. Taylor, sought to accomplish these results: To make a boiler of the most simple design; one which could easily be cleaned internally with the ordinary flue-scrapers or other tools now in common use, and that could readily be repaired; one in which the separation of steam from the water is accomplished while rising to the dome, thereby dispensing with heating coils; a boiler which should be all heating surface. He sought, further, to do away with the large cumbersome pipes and fittings usually employed for the downflow and distribution of water; to have direct and positive circulation constantly supplying all of the tubes with water, and preventing unequal expansion; to prevent priming even in the hardest firing and when starting the engine.

From the illustrations it will be seen that the Detroit boiler

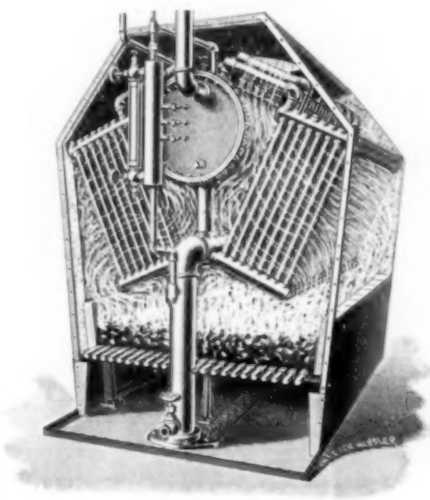


FIG. 1.—FRONT ELEVATION.

consists of one large upper drum, connected for its entire length to the water-distributing pipe below and parallel with it, by means of one row of vertical pipes for downflow of water. To either side of the water-distributer the lower tube manifolds are screwed in, and from these the tubes proper continue to the upper manifolds, which are connected to the top part of the drum with right-and-left nipples, for convenience of detaching in case of repairs being needed.

The tubes are inserted through the upper manifolds and screwed into both manifolds with right-hand threads, the top

FIG. 3.—TUBES AND MANIFOLDS.

ends of the tubes being so enlarged that both ends engage at the same time. The holes in the top of the upper manifolds are closed with brass plugs, not being exposed to the fire. Both manifolds are also plugged at both ends for convenience in cleaning out.

To each end of the water distributer is attached a sediment pocket, extending to the floor. To this is attached a foot or flange for supporting and fastening the boiler, which is also supported at the sides by the casing, the latter being fastened to the plugs in the upper manifolds.

From the side elevation it will be seen that the manifolds are placed so close together that the flame has to pass first to the outside, then toward the center, thus causing an upward circulation in the outer row of tubes, these being exposed to the hottest fire, and a downward circulation in those nearest the drum; hence the steam is partly separated from the water in the upper manifolds before it enters the drum. In entering the drum the steam strikes a baffle on either side, the water falling and the steam rising to the upper space where a perforated dry-pipe is located, extending from end to end of the drum.

New Doubling Machine.

Brief mention has been made heretofore of a patent granted William Thatcher annd William Jenkins, two employes of the New Castle Steel & Tin Plate Co, on a machine for doubling sheets. The machine in tests thus far made has done with perfect satisfaction the work which heretofore has been performed by hand. All that the operator does is to set the edges of the sheets in a straight line. A lever is then thrown,

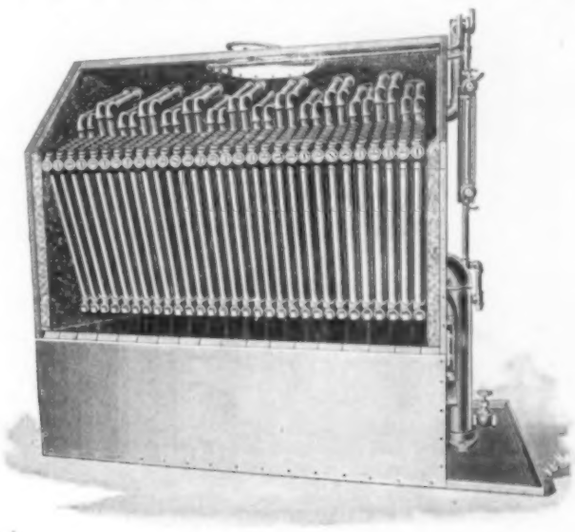


FIG. 2.—SIDE ELEVATION.

and the sheets, firmly held in place by metal fingers, are doubled in an instant. Just as the ends of the sheets unite, the fingers release their clasp and are withdrawn. The releasing of the sheets at the proper time formed the greatest obstacle the inventors encountered, and was overcome by a cam arrangement on the axle below the doubling table. The machine sits in a pit sunk into the floor, nearly all of the apparatus being below the floor level. The doubling table stands at a convenient height above the floor. The table is equipped with a shear, this being operated by a new arrangement of gearing. The sheets are thus doubled and sheared by the one machine. A guide for the shear prevents any departure from a perfect square in cutting.

It required 6,073 more railroad cars for the Alabama iron business for the first eight months of 1897 than were needed for it in the first eight months of 1896. A growing industry in Alabama and Tennessee is the manufacture of cast iron pipe. The shipments of iron pipe from these States in the nine months ending with September amounted to 30,727 tons. An officer of the Anniston Pipe & Foundry Co., of Anniston, Ala., recently stated that his company had contracts on hand for thousands of tons of soil pipe to go to foreign lands.

In Boston investment circles it is stated that the Illinois Steel Co. will earn its full interest charges this year, though for five or six months it has charged off $90,000 a month on high priced ore bought in 1896. The bills payable are $2,250,000, part of which is a $1,000,000 balance of the $1,500,000 borrowed early in the year.

One 12-inch mill of the Springfield Iron Co., Springfield Ill., started up last week and a 16-inch mill was put in operation this week. These two mills have a capacity of 500 tons a month.

MOLDING MACHINE.

A machine adapted to the lighter classes of castings turned out by stove works, agricultural implement works, and the like, has been designed by Leonard Fingal, of Chicago. An idea of it is given in Figs. 1 and 2, which are respectively an elevation and a horizontal section. Any ordinary flask may be used, of uniform size for each pattern or set of patterns, so that the cope may fit on any nowel. When the cope is provided with bars, the edges of the bars are so arranged that they will not interfere in pressing the sand. A greater quantity of loose sand is required, of course, than in hand molding, and a receptacle is provided for the extra sand — an addition to the flask, as seen at 5, Fig. 1. It is of the same width and length as the flask. The familiar method is employed of placing the flask upon a truck which runs on a tramway into position under the press. The truck consists of two cast iron frames, one fitting inside the other. The inner frame rests on two slides which run the entire length of the inside of the other frame. Two sides of the inner frame contain racks, into the niches of which are laid closely across the truck steel rods, from ¼ to ⅜ inch diameter, according to the character of the work to be done. These rods form a grate in the bottom of the truck, and through this the surplus sand falls as pressure is supplied. A piece of sheet iron covering the rods is cut out sufficiently to allow all the superfluous sand to escape when the mold is being formed, the shape of the opening in the sheet iron being governed by the shape of the pattern. When the pattern is irregular in shape, one portion extending farther down in the sand than another, the apertures in the grate should be larger underneath that portion.

In Fig. 1 *e* represents the pattern in the flask G when the pressure is applied. The press E may be operated either by steam or other means and is provided with guides fitted in the slides 3. The match board is provided with guides 4, fitting in slides on the inside of the reservoir. When a pattern is split straight, the halves can be attached to a straight and smooth follow-board, but when the pattern is whole or irregular in shape and must be made partly in the cope and partly in the nowel a double match or follow-board should be used.

The flask and reservoir are stationary, permitting the match-board with pattern to pass snugly through the reservoir to the edge of the flask and stop there. In making the mold the flask G, which is provided on each side with bearings or brackets, rests on two bars, one on each side, these bars resting on the two ends of the outer frame of the truck, so that the flask may almost touch the rods *d d*. When the mold is pressed and before the pattern is withdrawn, the inner frame, carrying the rods or grate, is shoved out with a wooden bottom board, which fits snugly below the flask. The pattern is then withdrawn and the nowel lifted with the bottom board. The object of removing the inner frame and replacing it with a bottom board in making the nowel is that the sand must have the board as a support in lifting it from the truck. As the cope is provided with bars for supporting the sand, no bottom board for that is required. In making a mold where no escape of sand is needed the grate is removed and the truck covered with a board and the flask placed thereon.

A sifting machine is connected with the molding machine, but separated from the latter so that the truck may be run underneath it. The sand is carried to the sifter by a belt conveyor and is sifted into the flask, in which it is evenly distributed. When the flask, with the reservoir on top of it is filled to its capacity with loose sand the truck with its load is run under the press. After the mold is pressed, the reservoir is removed and the flask is lifted from the truck. For making small bench work the sand can be pressed with a hand lever, but for small or medium sized floor work, hydraulic pressure is employed.

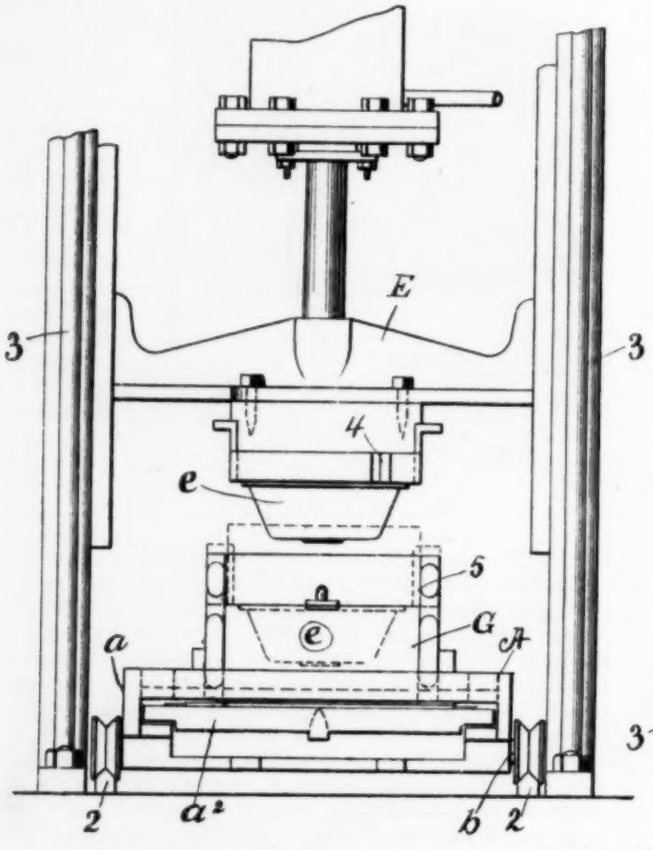


FIG. 1.

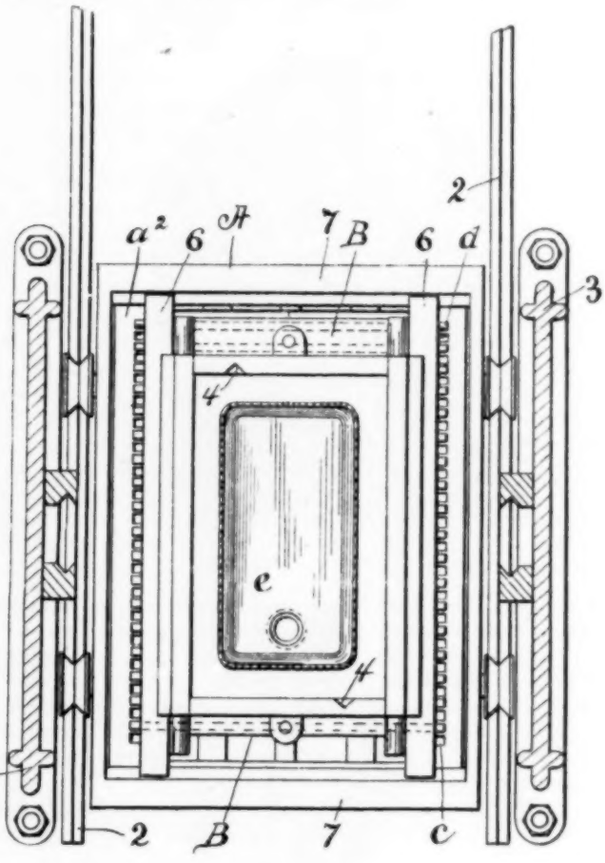


FIG. 2.

MOLDING MACHINE.

THE Marion Steam Shovel Co., Marion, O., has recently shipped to Washington Gulch, Mont., a complete outfit of machinery for placer mining. Demand for machinery of this sort is increasing rapidly. The plant of this company covers an area of 11 acres, and the company has built over 1,000 Marion steam shovels since 1884. It has recently put a new 1¾-yard class A steam shovel on the market, as well as a new 2½-yard class G shovel.

THE Spanish-American Iron Co., of New York, whose Cuban mines are close to Daiquiri, near Santiago de Cuba, has appointed Gildemeister & Kamp, of Coblentz, as its European representatives. The expectation is to build up a trade for Cuban ore in Germany and other European countries.

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INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants :—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Patee Bicycle Co. has been incorporated at Peoria, Ill., with a capital stock of $15,000, by Fred Patee, H. A. Simpson and Chas. F. Vail.

The Cowper Mfg. Co. has been incorporated at Chicago, with a capital stock of $10,000, to deal in machinery, by E. T. Noonan, Victor Elting and Sidney Schulte.

The California Artistic Metal & Wire Co. has been incorporated at San Francisco, with a capital stock of $50,000, of which $20,000 has been subscribed, by John T. McCormick, E. Coppieters, St. John E. McCormick and others.

The Schuylkill Valley Steel Co. is being organized at Birdsboro, Pa., with a proposed capital stock of $250,000, to erect a new steel plant. Those interested are Charles James, of Philadelphia; George Brooke, George Brooke, Jr., Edward Brooke, Robert E. Brooke, and H. Potts.

The Southern Iron & Steel Works, Birmingham, Ala., wants to buy lathe for facing columns, punch shear, belting, shafting, air compressor, cranes, wire-working machines, etc.

The Sunlight Gas Co., George Taylor, manager, Dallas, Tex., is in the market for sheet-iron machinery, tinners' tools, coiled copper and iron pipes.

The Burr Mfg. Co., 823 Society for Savings, Cleveland, O., want manufacturers' agents to write them in reference to securing territory and terms for handling their patent safety lift blocks.

New Construction:—

The Kansas City Car & Foundry Co., Kansas City, Mo., is rebuilding its foundry destroyed by fire some time ago. The new building will be 144x104 feet, with an engine and boiler house 26x30 feet in size. Estimated cost $25,000, capacity 250 car wheels per day.

The Cincinnati, Hamilton & Dayton Railway has awarded the contract for building its new shops at Lima, O., to the Moulton-Fisher Co., of Chicago. The structural iron contract goes to the Toledo Bridge Co., of Toledo, O.

Contract for the erection of the Northern Pacific machine shops, at East Grand Forks, Minn., has been awarded to Anderson & Hunter. Work will be commenced at once.

The Edward P. Allis Co., of Milwaukee, has taken a number of big European contracts this year. Among the more recent were orders from Middlesborough, Eng., for three engines of 600 or 700 h. p. each, and from Trieste, Austria, for two larger ones. The latter are for iron works, and weigh 500 or 600 tons apiece.

The plant of the Bonnet-Nance Stove Co., at Quincy, Ill., destroyed by fire recently, is to be rebuilt at once. The new building will be five stories, 120x60 feet in size.

The new boiler house which is being erected by the Waterbury Buckle Co., of Waterbury, Conn., will have a roof of corrugated iron supported on steel trusses. The building is 36 ft. wide and about 48 ft. long, having brick side walls. Every effort is being made to make this building fire-proof. The steel work is being furnished and erected by the Berlin Iron Bridge Co., of East Berlin, Conn.

The United Gas & Coke Co., of Pittsburg, whose by-product coke plant is located at McKeesport, has secured 400 acres of land near Boston and will erect Otto-Hoffman ovens on the property. It is also planned to pipe illuminating gas to supply the city of Boston. Work is to begin at once.

The construction of the entire furnace plant of the Union Iron Co., of Buffalo, is in the hands of Riter & Conley, of Pittsburg. The work which is now well under way, consists of the stack, four hot blast stoves 17x76, of the Hugh Kennedy type, cast house, stack house, engine house and hoisting tower. The casting house will be 300 feet long. The first of the blowing engines for the plant has been shipped. It is estimated that the cost of the plant complete will be close to $400,000. The expectation is that the furnace will be blown in by June 1, 1898. Frank B. Baird organized the new enterprise. With this new furnace and the Buffalo and Tonawanda furnaces all in blast the output of pig iron from the Buffalo district will be 1,000 tons a day.

The Pittsburg & Lake Erie Railway will build a bridge across the Shenango River at New Castle, Pa., to gain entrance to the new Shenango Valley tin plate plant.

The company operating the new sheet mill to be erected at Scottdale, Pa., by the recent employes of the Scottdale Iron & Steel Co., will be known as the Old Meadow Rolling Mill Co. John S. Parker has been made president and B. F. McCann, secretary.

The Pittsburg Bridge Co. has recently taken orders for six bridges in the city of Indianapolis.

The Foxboro (Mass.) Foundry & Machine Co., whose plant was destroyed by fire, will soon erect a stone and iron foundry, 137 x 82 feet, and a brick and iron machine shop, 35 x 96 feet.

The Berlin Iron Bridge Co., East Berlin, Conn., has received the contract for furnishing and erecting a foundry building for the J. & E. Stevens Co., of Cromwell, Conn.

Additions, Enlargements, Removals, Etc.:—

Fraser & Chalmers will make extensive additions to their plant at Washtenaw ave. and 12th st., Chicago, with the intention, it is understood, of removing the plant now at Fulton st. to the former location. The present improvements will cost about $200,000.

The Deering Harvester Co., of Chicago, is building an addition to its foundry, covering an area of 117 x 60 feet.

The American Brake Beam Co. will build an addition to its plant at Waukegan, Ill.

The Illinois Screw Co., of Chicago, is making plans for an addition to its plant at Chicago Heights, Ill.

The Gardner Motor Co., New Orleans, La., Theodore Grunewald, president, is remodeling an old building and adding a foundry to manufacture the Gardner gas engine and other specialties.

The Ferguson Tin Plate Co., operating a dipping plant at East Liberty, Pittsburg, is considering removing its plant and rebuilding on a much larger scale. In the event of rebuilding, a much larger plant will be built, including a three and four mill plant for the manufacture of black plate. Negotia-

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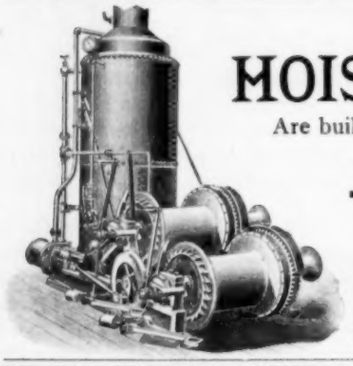
ST. LOUIS, 516 N. Third St. WASHINGTON, Kellogg Bldg.
MONTREAL, J. G. Sibbald, 3 Windsor Hotel.
SAN FRANCISCO, John Woodlock, 26 Beale St.



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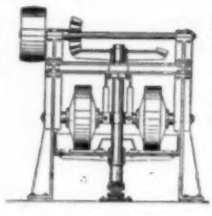

Grinding Pans.

Blast Furnaces,
Open Hearth Steel Furnaces,
Heating Furnaces,
Gas Producers, etc.
Iron and Brass Castings,
Bronze Tuyeres.

tions are now in progress with parties at Uniontown, Pa., and the plant may be removed there. It is understood that the concern has secured a large tract of land adjoining Uniontown and will build a new town if the citizens will buy $125,000 worth of lots, the proceeds to be held by Uniontown banks and applied to payment for the new plant.

The Lynchburg (Va.) Brass Manufacturing Co. has been incorporated, with capital stock of $15,000 and privilege of increasing to $25,000, for the purpose of manufacturing brass goods, etc. John F. Slaughter is president; William Hurt, vice-president; E. O. Bayles, secretary-treasurer, and E. S. Whiting, general manager. The company is the reorganization of the Maryland Brass Mfg. Co., which lately arranged for the removal of its plant to Lynchburg.

Fires and Accidents:—

The forging department of the Buckeye Mfg. Co., at Anderson, Ind., was destroyed by fire on the 12th inst., the loss being $20,000, covered by insurance. It will be rebuilt immediately.

The machine and pattern shops of I. B. Coleman's iron works, Elmira, N. Y., were burned Nov. 12. The loss was $20,000; insurance, $4,000.

Reid & Brown's foundry, Toronto, Ont., was damaged $4,000 by fire Nov. 9.

Goodell & Waters' foundry, Philadelphia, burned, Nov. 10, with a loss of $15,000, covered by insurance.

The Fingal Foundry, Fingal, Ont., owned by MacPherson & Co., manufacturers of threshing machinery, was burned Nov. 11. It had been closed for several weeks.

General Industrial Notes:—

The Dean Bros. Steam Pump Works, Indianapolis, have recently received orders for marine pumps for steamships now being built by the Chicago Shipbuilding Co., the Cleveland Shipbuilding Co., the Globe Iron Works, the Union Dry Dock Co., and F. W. Wheeler & Co. These orders include independent air pumps and condensers of 15,000 h. p. Also 10 ballast pumps 12x18x20 inches, aggregating in all 40 steam pumps.

The Shenango Valley Steel Co., of New Castle, has ordered of the Cahall sales department, Bank of Commerce Bldg., Pittsburg, 6,000 h. p. Cahall vertical water tube boilers for the new 30-mill tin plate plant, now building at New Castle.

The Cohoes Rolling Mills, Cohoes, N. Y., have started up eight furnaces.

The Glendon Iron Co. plant and real estate near Easton,

U. BAIRD MACHINERY CO.

123 AND 125 WATER STREET, **PITTSBURG, PA.** 124 AND 126 FIRST AVENUE.

MACHINE TOOLS AND SUPPLIES.

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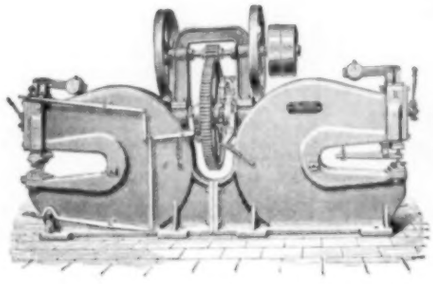

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Pa., were offered at sale Nov. 11, by the assignees. Eleven tracts, including all the furnaces, ore mines, the village of Browntown, the company's property in the borough of Glendon and on the north side of the Lehigh River, were all to be sold, but as bidders were few much of the property remains undisposed of. The principal sale made was that of the company's 24 houses, to Thos. C. Brown, for $1,867.

An inventory of the personal property and assets of the Duquesne Tube Works Co., of Pittsburg, was filed in court last week. The stock is worth $25,127.50 and there are bills receivable amounting to $23,221.09.

It is reported that three new puddling furnaces have been started by the Altoona Iron Co. It is said the company has orders on hand to last until Jan. 1.

The Finished Steel Co., Youngstown, O., manufacturer of polished drawn shafting up to four and a half inches in diameter, is operating its plant to its full capacity and has quite a number of orders on hand. This concern has recently made shipments of shafting to England and Denmark.

The Carnegie Steel Co., Ltd., has ordered 13 ladles for the Duquesne Steel Works. They are each of 45 tons capacity, and are being built by Riter & Conley, of Pittsburg.

Riter & Conley, of Pittsburg, are erecting for the Union Traction Co., of Philadelphia, a stack, 11 feet in diameter and 172 feet high, and for Clark & Allen, of New York, a grain elevating and storage plant.

The Reading Iron Co., of Reading, Pa., after thorough investigation of fire-brick hot blast stoves, in the Pittsburg and Chicago districts, have decided to erect at their new furnace four Massicks & Crooke patent fire-brick hot blast stoves of the three-pass type with McClure & Amsler's patented improvements, which are built by G. W. McClure & Son, Carnegie Bldg., Pittsburg. The stoves are to be 19 feet 6 inches in diameter and 75 feet high.

The S. Freeman & Sons Mfg. Co., Racine, Wis., is running all shops full time, and has among other contracts on hand the following: Three boilers 72 inches by 18 feet, for the J. I. Case Plow Co., Racine, Wis., being built under the Hartford Steam Boiler & Insurance Co.'s specifications; one boiler, 66 inches by 16 feet, for Marshfield, Wis.; a Clyde marine boiler, 72 inches by 18 feet; two 60-inch boilers for Kenosha and Camden (S. C.) water-works, respectively; one 66-inch boiler for the Highland Park electric light plant. The company also has contracts for one 9-foot rice cooker for Boston, and rice cookers of the same dimensions for Springfield, Mass., and for another firm in Boston. It has recently shipped several of these devices. It is also busy in the tank department, having among other orders ones for some large brine tanks and condenser pans.

The tinning departments of the New Castle Steel & Tin Plate Co.'s plant has been undergoing repairs. Work was resumed last week.

The Sloss Iron & Steel Co., Birmingham, Ala., it is announced, will increase its capital stock, which now amounts to $4,000,000, probably by $500,000 more, to develop its possessions, especially in the vicinity of Leeds, Ala., where the Southern Railway has surveyed for a 10-mile branch from Leeds to the brown ore beds, and, it is said, will lay tracks at once.

R. D. Wood & Co., Philadelphia, have chartered the American bark Mary Hasbrouck to carry about 800 tons of cast-iron water pipe to New Zealand. They are also reported to have secured an order recently from the Rural District Council of Axbridge, Somerset, England, for 800 tons of cast-iron socket water pipe of 3 to 6 inches in diameter at a bid of £4,581 against eleven other firms, all European.

The Tidewater Steel Works, Chester, Pa., are running day and night.

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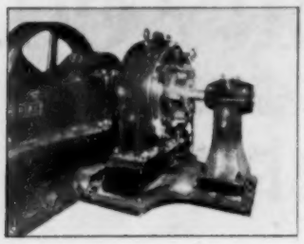

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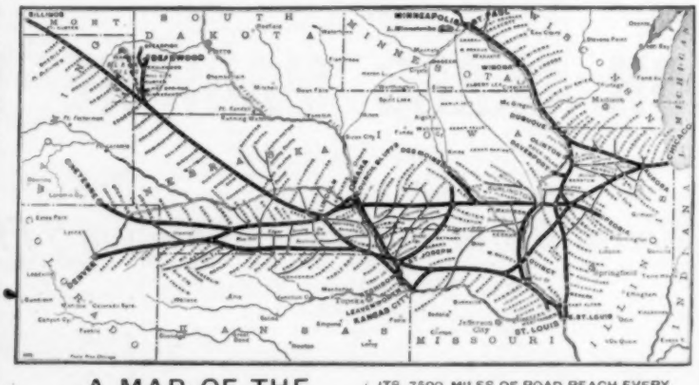

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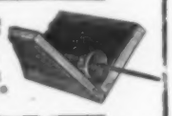

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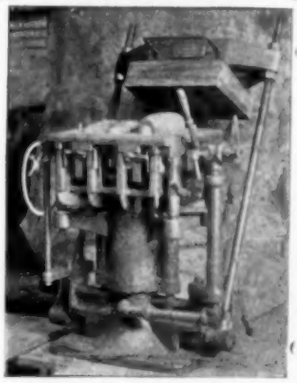

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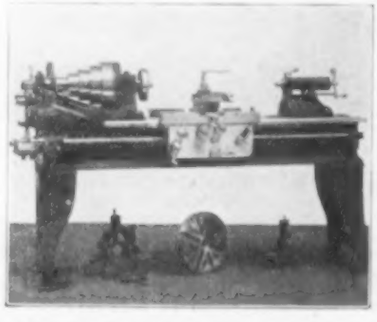

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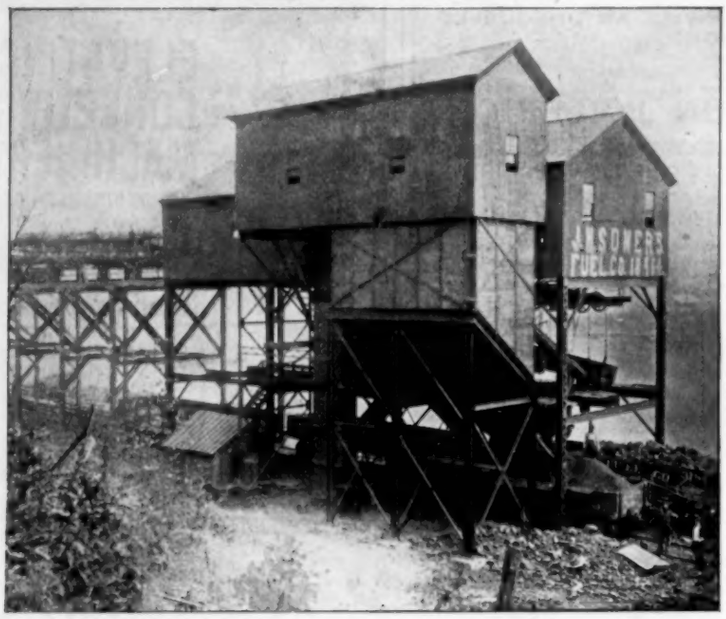

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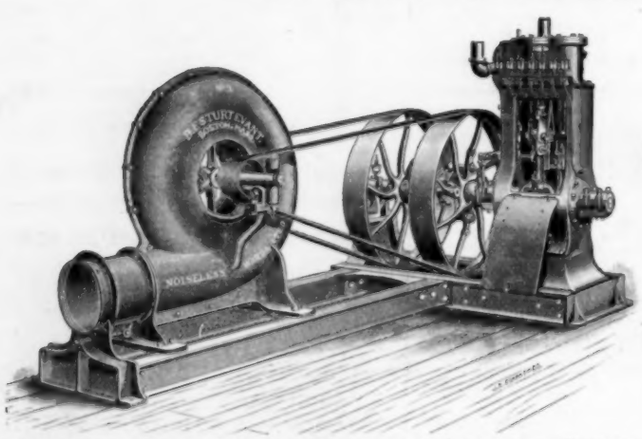

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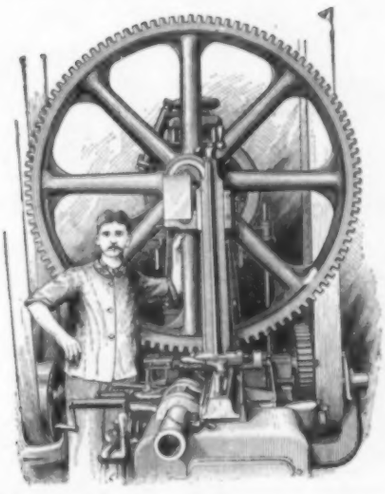

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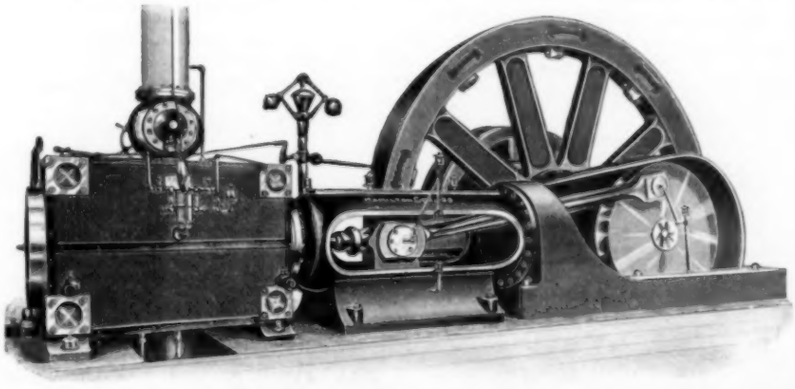

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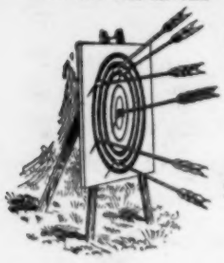

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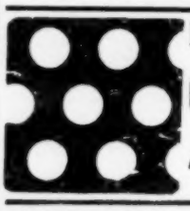

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Planers—
Lodge & Shipley Machine Tool Co., Cincinnati.
U. Baird Machinery Co., Pittsburg, Pa.

Plates—
Enterprise Boiler Co., Youngstown, O.

Plumbers' and Gas Fitters' Supplies—
C. H. Besly & Co., Chicago, Ill.

Pneumatic Appliances—
Clayton Air Compressor Works, New York.

Portable Forges—
C. H. Besly & Co., Chicago, Ill.
B. F. Sturtevant Co., Boston, Mass.

Power Presses—
Bertsch & Co., Cambridge City, Ind.
Long & Allstattar Co., Hamilton, O.
Perkins Machine Co., Boston, Mass.

Power Transmission Machinery—
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.
Jeffrey Mfg. Co., Columbus, O.
The Lane & Bodley Co., Cincinnati, O.

Presses—
Toledo Machine & Tool Co., Toledo, O.
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
Long & Allstatter Co., Hamilton, O.
Perkins Machine Co., Boston, Mass.

Pressure Reducing Valves—
W. H. Bosworth, Cleveland, O.

Pulleys—
W. A. Jones Foundry Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.

Pumps (Steam)—
The Edward P. Allis Co., Milwaukee, Wis.
Henry R. Worthington, Brooklyn, N. Y.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
W. H. Bosworth, Cleveland, O.

Punches—
Walker Bros., Lansing, Mich.

Pyrometers—
Edward Brown, Philadelphia, Pa

Radial Drills—
Dietz, Schumacher & Boye, Cincinnati, O.

Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland.

Riveting Machinery—
Wm. H. Wood, Media, Pa.

Rock Drills—
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

Rolling Mill Machinery—
The Lloyd Booth Co., Youngstown, O.

Roofs—
Shiffler Bridge Co., Pittsburg.

Safety Lift Blocks—
Burr Mfg. Co., Cleveland, O.

Sand and Chill Rolls—
The Lloyd Booth Co., Youngstown, O.
Lorain Foundry Co., Lorain, O.
Seaman, Sleeth Co., Pittsburg, Pa.

Saws—
Peter Gerlach & Co., Cleveland.

Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.

Screws—
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill.

Semi-Steel—
The King & Andrews Co., Chicago, Ill.

Shafting—
The Lane & Bodley Co., Cincinnati, O.

Shearing and Punching Machinery—
Bertsch & Co., Cambridge City Ind.
Toledo Machine & Tool Co., Toledo, O.
Long & Allstatter Co., Hamilton, O.
Perkins Machine Co., Boston, Mass.
Fox Machine Co., Grand Rapids, Mich.

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland
Ætna-Standard Iron & Steel Co., Bridgeport, O
E. H. Stroud & Co., Chicago, Ill.

Special Machinery—
Toledo Machine & Tool Co., Toledo, O
Edwin Harrington Son & Co., Philadelphia.
Perkins Machine Co., Boston, Mass

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
C. H. Besly & Co., Chicago Ill

Steam Packing—
C. H. Besly & Co., Chicago, Ill.

Steam Shovels and Dredges—
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

Steel—
Otis Steel Co., Cleveland, O.
Miller, Wagoner & Bentley, Chicago, Ill.
E. H. Stroud & Co., Chicago, Ill.

Steel Castings—
W. H. Bosworth, Cleveland, O.
The King & Andrews Co., Chicago, Ill.
Otis Steel Co., Cleveland, O.

Steel Rails, Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland
Bethlehem Iron Co., South Bethlehem,
Cambria Iron Co., Johnstown, Pa.

Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland.

Stokers—
Playford Stoker Co., Cleveland, O.
Brightman Furnace Co., Cleveland, O.
Westinghouse, Church, Kerr & Co., New York City.

Tackle Blocks—
Burr Mfg. Co., Cleveland, O.

Tanks—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.

Tinning Machinery—
W. H. Bosworth, Cleveland, O.
The Lloyd Booth Co., Youngstown, O.

Tin Plate—
Ætna-Standard Iron & Steel Co., Bridgeport, O

Tin and Terne Plates—
B. P. Crane & Co., Chicago, Ill
E. H. Stroud & Co., Chicago, Ill.

Tool Steel—
C. H. Besly & Co., Chicago, Ill.

Transmission Machinery—
Link-Belt Machinery Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
Jeffrey Mfg. Co., Columbus, O.

Tube Welding—
S. Fix Sons, Cleveland.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland.
W. H. Bosworth, Cleveland, O.

Twist Drills—
C. H. Besly & Co., Chicago, Ill.

Valves—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.
The Lunkenheimer Co., Cincinnati, O.

Ventilating Fans—
B. F. Sturtevant Co., Boston Mass.

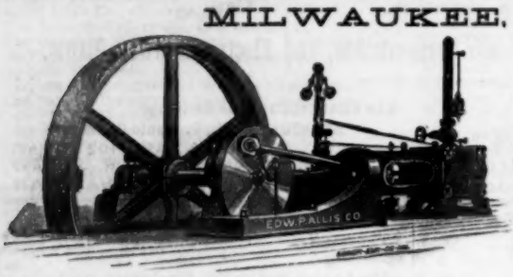
Wheelbarrows—
Akron Cultivator Co., Akron, O.
Lansing Wheelbarrow Co., Lansing, Mich.

Wire Machinery—
John Adt & Son New Haven Conn.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio
Wm. Glader, Chicago, Ill.

Wire Nail Machinery—
Wm. Glader, Chicago, Ill.

THE EDWARD P. ALLIS COMPANY

MILWAUKEE, WIS.



MANUFACTURERS OF

ICE and REFRIGERATING MACHINERY, Blowing Engines, Hoisting Engines, Pumping Engines Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills. Ore Crushers, Crushing Rolls, Stamp Mills Concentrators, General Mining Milling and Smelting Machinery.

Reynolds Corliss Engines.

NEW YORK. CHICAGO. MINNEAPOLIS. DENVER. BUTTE. CITY OF MEXICO. SAN FRANCISCO PITTSBURG.

WE DO IT WELL,
WE DO IT CHEAP.

Established 1836.

Having recently installed a new and modern Plant, we are prepared to do all kinds of

GALVANIZING

and solicit correspondence from any manufacturer or anyone having goods to be galvanized. Prompt and excellent work assured. Prices low, considered.

SIDNEY SHEPARD & CO., Buffalo, N. Y.

Manufacturers and Jobbers of Housefurnishing Hardware, Metals, Etc.

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Special low-phosphorus hard Ore, Bessemer	$3.40@3.46
No. 1 Specular, Bessemer	3.05@3.17
No. 1 Bessemer hematite	2.60@2.90
Hematites No. 1 non-Bessemer	2.00@2.25
No 1. Specular, non-Bessemer	2.40@2.60

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$10 25@10 50
No. 1 Strong Foundry	10 65@11 00
No. 2 Strong Foundry	10 15@10 40
Gray Forge, red short	9 40 9 50
Gray Forge, neutral	9 65
No. 1 American Scotch	10 75@11 15
No. 2 American Scotch	10 25@10 50
Lake Superior Charcoal	12 00@12 25
PITTSBURG:	
No. 1 Foundry	$10 75@10 90
No. 2 Foundry	10 75@10 40
Gray Forge	9 25@9 40
White and Mottled	9 50
Warm Blast Charcoal	13 00@13 50
Cold Blast Charcoal	16 00
Bessemer	9 50@9 60
CHICAGO:	
Lake Superior Charcoal	$12 50@$13 00
Local Coke Foundry No. 1	11 50@13 00
Local Coke Foundry No. 2	10 75@11 00
Local Coke Foundry No. 3	10 25@10 75
Local Scotch Foundry No. 1	11 50@12 00
Local Scotch Foundry No. 2	11 00@11 50
Local Scotch Foundry No. 3	10 50@11 00
Southern Coke No. 1	11 00@11 25
Southern Coke No. 2	10 60@10 85
Southern Coke No. 3	10 35@10 60
Southern No. 1 Soft	11 00@11 25
Southern No. 2 Soft	10 60@10 85
Southern Silveries	11 25@11 50
Jackson Co. Silveries	12 50@14 50
Ohio Silveries No. 1	@
Ohio Strong Softeners	12 00@12 25
Alabama Car Wheel	16 00@17 00
Malleable Bessemer	10 75@11 00
Coke Bessemer	11 50@12 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 10 00
Southern Coke No. 2 and No. 1 Soft	9 75
Hanging Rock Coke, No 1	9 45
Hanging Rock Charcoal No. 1, Fdy	14 50@15 50
Tennessee Charcoal No 1	12 50@13 00
Jackson County Silvery No 1	12 50@13 00
Southern Coke, Gray Forge	9 25
" " Mottled	9 00
Standard Georgia Car Wheel	14 25@15 00
Tennessee " "	13 00@14 00
Lake Superior " "	14 25@14 50
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	11 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 75
Ohio Strong Softener No. 1	11 75
Jackson Co. Silvery No. 1	14 00
Lake Superior Charcoal	15 50
Southern Soft No. 1	11 75
Hanging Rock Charcoal	17 00
ST. LOUIS:	
Southern Coke No 1	$10 50@$10 75
Southern Coke No. 2	10 25
Southern Coke No. 3	9 75@10 00
Southern Gray Forge	9 75
Southern Charcoal No. 1	12 50
Missouri Bessemer	12 00
Ohio Softeners	14 00
Lake Superior Car Wheel	13 50
Southern Car Wheel	13 25

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	GROSS TONS
Old iron rails	$14 00
Old steel rails (6 ft. and over)	10 50
Old steel rails (6 ft. and under)	10 00
Old car wheels	11 00
	NET TONS
No. 1 R. R. wrought scrap	$11 50
Mill scrap	8 50
No. 1 Machine cast scrap	8 00
Iron axles	15 00
Axle turnings	8 00
Wrought turnings (free from cast)	6 50
Cast borings	5 25
Uncut wrought iron boilers	3 50
Steel boiler plates	8 00
Grate bars	5 25
Pipes and flues (clean)	7 50
Tank iron	7 00
Hoop and band iron	6 50
Sheet iron	5 00
Wrought drillings	6 00
Malleable iron	8 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.15c
Angles	1.10c
Tees	1.25c
Universal Plates	1.15@1.20c
Sheared Plates	1.20c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1⅞	1.10 Base.
2 to 2⅞	.20 extra.
3 to 3½	.50 "
3½ to 4	.80 "
4½ to 4¾	1.00 "
4¾ to 5	1.30 "
5½ to 6	1.80 "
6½ to 6¾	2 30 "

6⅝ to 7⅞	2.50 extra.
¾ to ⅞	.10 "
⅜ to 11-16	.20 "
½ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
5-16 to 11-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1¼ to 4 x ⅜ to 1	1.05 Base.
4¼ to 6 x ⅜ to 1	.10 extra
6¼ to 8 x ⅜ to 1	.60 "
8¼ to 10 x ⅜ to 1	.80 "
1⅜ to 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅝ to 2	.50 "
4¼ to 6 x 1⅝ to 2	.60 "
6¼ to 8 x 1⅝ to 2	.80 "
8¼ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4¼ to 6 x 2⅛ to 3	.80 "
6¼ to 8 x 2⅛ to 3	1.00 "
1⅜ to 1⅜ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅝	.20 "
¾ to 15-16 x ⅜ to ¾	.40 "
⅜ to 11-16 x ⅜ to ⅝	.50 "
½ to 9-16 x ⅜ to ⅝	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1⅜ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30 "
¾ to 15-16 x ¼ to 5-16	.50 "
⅜ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

to 8 x No. 9 to 3-16	.90 extra.
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¾ to 4 x No. 9 to 3-16	.40 "
1¾ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40 "
⅜ x No. 9 to 3-16	1.50
⅜ x Nos. 10, 11 and 12	1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

¾ to 1¼	.40 extra.
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅜ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra.
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
⅜ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16 "	1.50 Base. Extras.
1¼ to 6,	" 10, 11, 12 or ¼"	.05 per 100 lbs.
1 to 1¾,	" 7, 8, 9 or 3-16"	.10 "
1 to 1¾,	" 10, 11, 12 or ¼"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or ¼"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10 11, 12 or ¼"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10 11, 12 or ¼"	.45 "
½,	Nos. 7, 8, 9 or 3-16"	.55 "
½,	" 10, 11, 12 or ¼",	.60 "
7-16	" 7, 8, 9 or 3-16"	.75 "
7-19	" 10, 11, 12 or ¼"	.85 "
⅜,	" 7, 8, 9 or 3-16"	.95 "
⅜,	" 10, 11, 12 or ¼"	1.05 "

Iron and Steel Hoops.

Width in Inches.	English Standard Gauge.	
1 7-16 to 3	Nos. 13, 14, 15 and 16	1.50 Base. Extras
1 7-16 to 2,	" 17, 18, and 19	.05 per 100 lbs.
1 7-16 to 2,	" 20	.10 "
1 7-16 to 2,	" 21	.15 "
1 -16 to 1¾,	" 22	.25 "
to 1⅜,	" 13, 14 and 15	.05 "
1⅜	" 16,17 and 18	.10 "

PERFORATED METALS

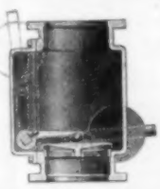
OF ALL KINDS FOR

MILLING, MINING AND AGRICULTURAL MACHINERY.

Perforated Iron, Steel, Copper, Brass, Tin, Zinc, Lead, Etc., to Order.
Large and Varied Assortment of Sizes. Correspondence Solicited.

THE ROBERT AITCHISON PERFORATED METAL CO.,

Office, Room 510, 265 to 269 Dearborn St., CHICAGO, ILL. Works, So. Chicago.



Excelsior Straight-Way Back Pressure Valve.

This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well made. Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

JENKINS ROTHERS, NEW YORK, PHILADELPHIA, BOSTON, CHICAGO.

Akron Tubular Steel Wheelbarrows.

RE-INFORCED TRAYS.
SOLID FRAME.
NO HOLES DRILLED INTO IT.
ALL PARTS CLAMPED ON.

Perfect Forward Dump.
Strongest, Easiest Handled.
Lightest and Most Durable.

McNEIL'S PATENT BALANCED AUTOMATIC DUMP CHARGING BARROW.

The Akron Cultivator Co.,
MANUFACTURERS, Akron, Ohio.

TUBULAR STEEL BARROWS.

Special hand-made pig iron barrows.

WHEELBARROW CARS AND TRUCKS

WRITE FOR CATALOGUE.

LANSING WHEELBARROW CO.,
Lansing, Mich.

Don't Waste Money in Your Pattern Shop.

THE GOBEILLE PATTERN CO., Cleveland.

Not every insertion of every advertiser's card brings an order for the advertiser's good; no more does every visit of the traveling salesman result in a sale.

There is a vast deal in familiarity with the type and phrase in which a manufacturer makes himself known to the advertisement reader, just as the personal acquaintance of his traveling salesman gets him a hearing when a strange face and a strange voice are bowed out with a "busy day's" courtesies.

The best advertisers, the most successful advertisers, the advertisers who get returns, are those who keep everlastingly at it.

This is a case in which familiarity breeds business.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND OHIO.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

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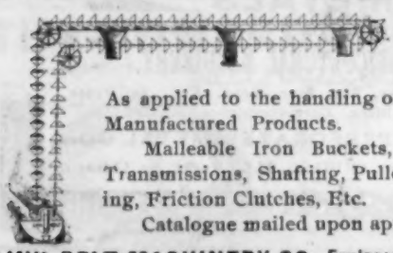

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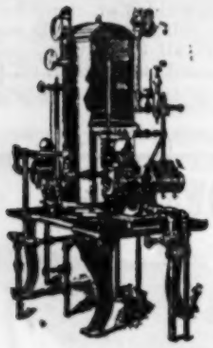

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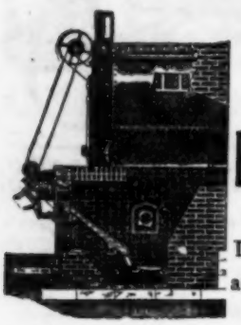

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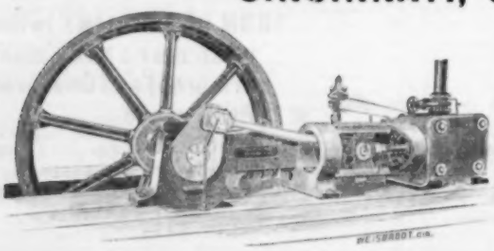

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⅞,	"	16, 17 and 18	.25 "
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⅞,	"	21	.35 "
⅞,	"	22	.45 "
¾ and 13-16	Nos.	13, 14 and 15	.30 "
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¾ and 13-16	"	19 and 20	.40 "
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9-16,	"	13, 14 and 15	.45 "
9-16,	"	16, 17 and 18	.50 "
9-16,	"	19 and 20	.60 "
9-16,	"	21	.70 "
9-16,	"	22	.80 "
9-16,	"	23	.90 "
½,	"	13, 14 and 15	.55 "
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No. 10	1 50
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No. 14	1 60
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No. 18	1 85
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Jessop's	15¾c
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Bessemer Machinery	base price,	1 40
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7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅝ to 11-16 and 4⅛	.10
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Lap weld black, base, and 10 per cent.	.78
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Moulders'		dis 40&10&10
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Rivets.

Iron, Thousand, list November 1, 1894.....dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894.....dis 60@65
Copper.....dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Apr. 9, 1894

Brass.....dis 35
Copper.....dis 35c
Bright and annealed, Nos. 0@18.....dis 70&10&5
" " Nos. 19@26.....dis 75&5
" " Nos. 27@36.....dis 75&10&5
Coppered Nos. 0 to 18, market list.....dis 70&10&5
Galvanized Nos. 0 to 18 " " .....dis65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5&10
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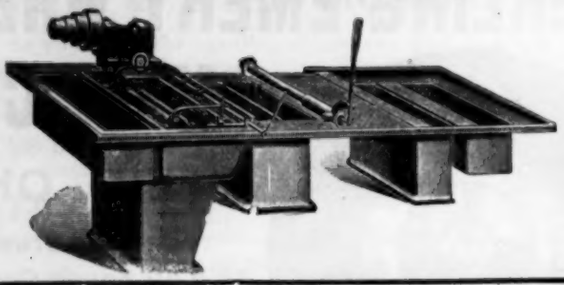

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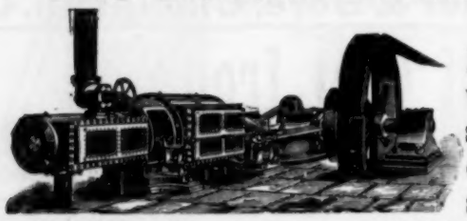

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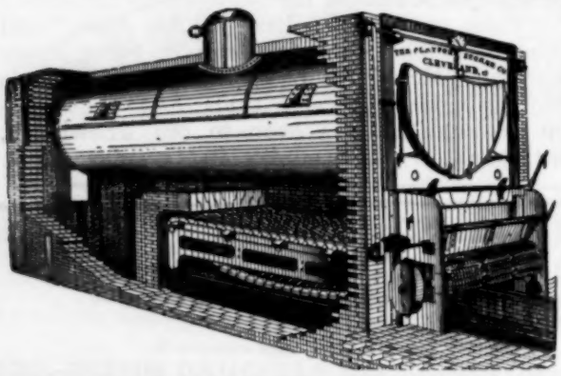

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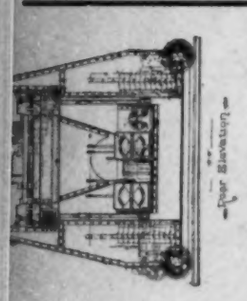

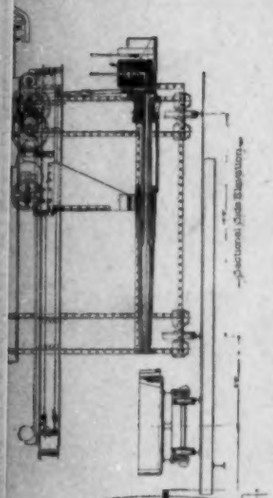

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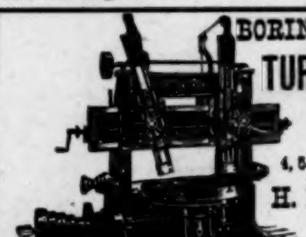

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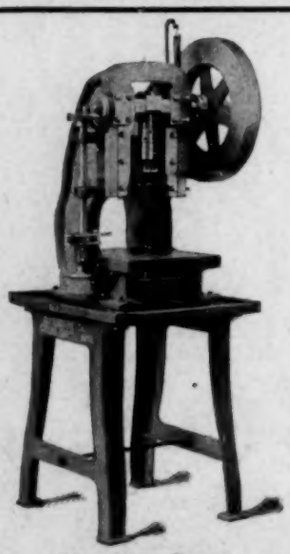

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